Study of Resource Center as new concept in Republic of Nauru, where is very limited Internet connection (J2)

Final Report

(Activity and Accounting)

September 30, 2015

Department of Information & Communication Technology
Ministry of Telecommunications
Republic of Nauru

KDDI foundation
JAPAN

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1. Executive Summary

On behalf of the APT J2 project in Republic of Nauru, regarding “Study of Resource Center as new concept in Republic of Nauru, where is very limited Internet connection”, we would express sincere application on the selection and financial support by APT in order to complete this project in Nauru.

We will submit this interim report to APT with our intermediate results, activities and future activities and plan of this J2 project to date. The interim report is contained activity report and accounting report till now.

Following section are the interim report of our activities and results at this point of our APT J2 project, herein.

2. Introduction

1-1. **NAME OF THIS PROJECT**

Study of Resource Center as new concept in Republic of Nauru,
where is very limited Internet connection (J2)
APT ref.: APT/J2J3/Result/App 06 March 2013

1-2. **OBJECTIVES**

Our objectives are study and research how to establish and what function and how to implement for the ICT Resource Center in Republic of Nauru. And our target is that people in Nauru get their benefit to touch information and learn through the ICT technology as well as real contents at library, from review of video, multimedia and rich contents, timely, effectively, adequately, and appropriately. The concept of ICT Resource Center is resolution by improving and developing people literacy and life in the island far away from outer information and with so slow speed Internet communications. The ICT Resource Center is that offers a range of ICT delivered education. The ICT Resource Center however also offers a search and storage of real and electrical information of other area.

“The ICT Resource Center” by Nauru will become a core part of the National ICT Center. ICT Resource Center will be opened to people who wish to learn ICT literacy, effective and efficient use of ICT in various fields, and especially, this center will have an important function to educate and train promising young leaders to become ICT experts, industrial and governmental professional as well, in Nauru.

Further steps for the establishment of the National ICT Center are;

To integrate school's computer labs and health center network into G-LAN for secure operation and broadband access to the Internet, To establish digital contents library regarding ICT education and learning. To save cost by stimulating competition between Internet access providers, and To upgrade G-LAN by utilizing broadband optical fiber cable and/or wireless technologies such as Wi-Fi and WiMAX. In addition there are many subjects to be challenged for secure and stable operations of the G-LAN.

These are:

To protect G-LAN and ICT systems from unstable power supply, To strengthen "Anti-Computer-Virus" activities for the safety operations, and To protect G-LAN from outside cyber attack.

In conclusion;

Successful implementation will become an important first step for Nauru to establish the ICT Resource Center, and project members of Nauru side will acquire know-how of ICT project formation and implementation, together with experiences of sustainable operation. The National ICT Strategy and Policy will be established based on the achievements of the ICT Resource Center.

1-3. **CURRENT STATUS**

Unique history of Nauru in recent years;

Independence Nauru became self-governing in January 1966. On 31 January 1968, following a two-year constitutional convention, Nauru became the world's smallest independent republic. It was led by founding president Hammer DeRoburt. In 1967, the people of Nauru purchased the assets of the British Phosphate Commissioners, and in June 1970, control passed to the locally owned Nauru Phosphate Corporation. Money gained from the exploitation of phosphate was put into the Nauru Phosphate Royalties Trust and gave Nauruans the second highest GDP Per Capita (second only to the United Arab Emirates) and one of the highest standards of living in the Third World.

In 1989, Nauru took legal actions against Australia in the International Court of Justice over Australia's actions during its administration of Nauru. In particular, Nauru made a legal complaint against Australia's failure to remedy the environmental damage caused by phosphate mining.

Certain Phosphate Lands: Nauru v. Australia led to an out-of-court settlement to rehabilitate the mined-out areas of Nauru. By the close of the twentieth century, the finite phosphate supplies were fast running out. Nauru finally joined the UN in 1999.

As its phosphate stores began to run out (by 2006, its reserves were exhausted), the island was reduced to an environmental wasteland. Nauru appealed to the International Court of Justice to compensate for the damage from almost a century of phosphate strip-mining by foreign companies. In 1993, Australia offered Nauru an out-of-court settlement of 2.5 million Australian dollars annually for 20 years. New Zealand and the UK additionally agreed to pay a one-time settlement of $12 million each. Declining phosphate prices, the high cost of maintaining an international airline, and the government's financial mismanagement combined to make the economy collapse in the late 1990s. By the new millennium, Nauru was virtually bankrupt.

President Bernard Dowiyogo took office in April 2000 for his fourth and, after a minimal hiatus, fifth stints as Nauru's top executive. Dowiyogo first served as president from 1976 to 1978. He returned to that office in 1989, and was re-elected in 1992. A vote in parliament, however, forced him to yield power to Kinza Clodumar in 1995. Dowiyogo regained the presidency when the Clodumar government fell in mid-1998.

In 2001, Nauru was brought to world attention by the Tampa affair, a Norwegian cargo ship at the centre of a diplomatic dispute between Australia, Norway and Indonesia. The ship carried asylum seekers, hailing primarily from Afghanistan, who were rescued while attempting to reach Australia. After much debate many of the immigrants were transported to Nauru, an arrangement known in Australia as the "Pacific Solution". Shortly thereafter, the Nauruan government closed its borders to most international visitors, preventing outside observers from monitoring the refugees' condition. Above unique situation on Nauru, people in Nauru has very limited and constrain to learn anything and to communicate with outer world, who knows the past their glory. Also it is hard to enter into Nauru because not only above situation but also air flight is very limited (once a week) and un-scheduled.

In September, 2012, Australian government and Nauru government took agreement of refugee camp in Nauru (boat people from Iraq and India to Australia) again.

Telecommunication Tragedy in Nauru;

Telephones - main lines in use: 1,900 (2009), But in 2011, there are no connection, it means that 0 fixed telephone available now as the old telephone exchange was disbanded due to bankruptcy of only one telecom company in Nauru.

Telephones - mobile cellular: 6,600 (2011). But, at present, only one telecommunication company (Digicel) Nauruan make Mobile Calls and as of October 2011, only 330 Access the Internet through the Digicel network. With exclusive contract with Nauru Government.

Internet connection will be provide in competition in near future, however before open the market, it must be threw up of the exclusive contract on mobile service.

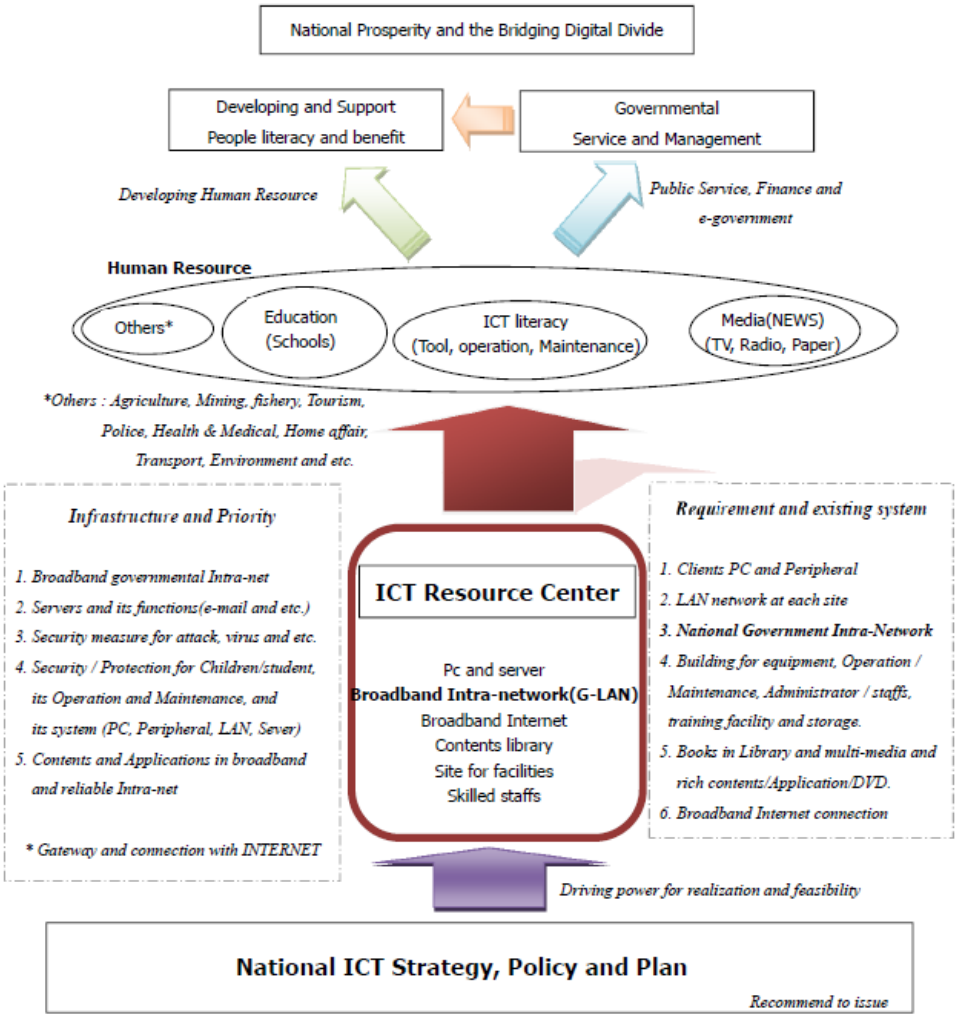
International: country code - 674; satellite earth station - 1 Intelsat (Pacific Ocean) used for Digicel. Broadcast media (Media Center): 1 government-owned television station broadcasting programs from Australia and New Zealand sent via satellite or on videotape; 1 government-owned radio station, broadcasting on AM and FM, utilizes Australian and British programs (2009), 1 government newspaper once a week delivery (print at outside) Internet country code: .nr and Internet hosts: 4,158 – Mostly Government (2010)

1-4. **PURPOSE OF THIS PROJECT**

We will describe the New Concept of the ICT Resource Center met with the situation in Nauru. Based on research and study of current situation of ICT in Nauru, Summary conclusions of the APT J2 project are as follows;

- The ICT Resource Center consists of ICT Facilities, Contents, Applications and G-LAN.
- Figure 1 describes the concept and overview of the ICT Resource Center.

Figure 1. Concept and overview of the "ICT Resource Center" in Nauru



- The ICT Resource Center will become a core part of the national ICT center.
- G-LAN will become a network infrastructure of the ICT Resource Center connecting government offices, schools and hospital/health centers with secure and broadband network.
- Figure 2 describes rough design of core part of G-LAN in enlarged Yaren Area. in this J2 project.

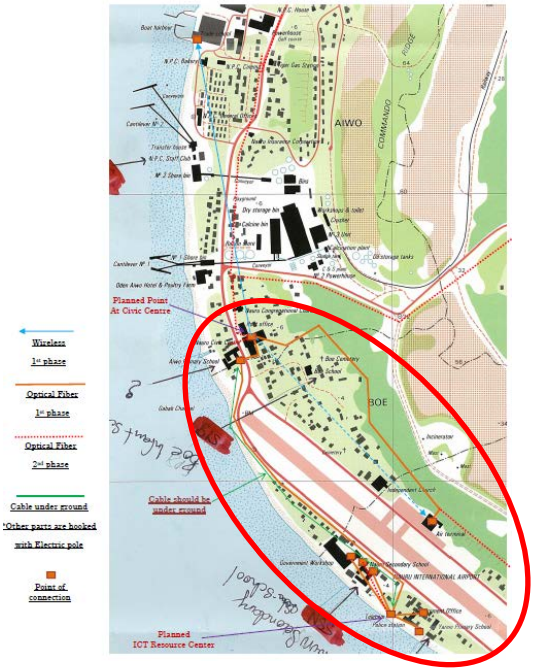


Figure 2. G-LAN Design for APT J2

This proposal is the first phase activity of establishing the ICT Resource Center which should be followed up by J3 project, projects by Nauru government herself, or project by others to finalize the national ICT center. National ICT Strategy and Policy should be established based on the achievements of the ICT Resource Center as national ICT center activities.

1-5. **PARTNERS IN THIS PROJECT**

Republic of Nauru:

Department of Information & Communication Technology (DICT)
(Department of Education)
(Department of Health)

JAPAN:

KDDI foundation

Applicant & Chief researcher:

	Director, DICT	Mr. Geoffrey Harris
Account Manager:	KDDI-Foundation	Mr. Yosuke Uchiyama

Support corporations:

Nauru: Nauru Utility Corporation (Construction support)
Nauru Government (Finance)
Japan: OCC Corporation (Fiber cable supplier)

1-6. **MILESTONE (SIGNIFICANT PHASES) IN PROPOSAL**

1. Start up the project with by e-mail and voice
2. Kickoff meeting and Site Survey in Nauru
3. Network and system design including discussion of national strategy
4. Tokyo meeting and training in Japan (national measure as well as technology)
5. Procurement and preparation
6. Shipping (export and import)
7. Installation and Evaluation in Nauru
8. Practice/Evaluation by both sides
9. Reporting to APT (Interim and Final/Activity and Accounting)

1-7. **EXPECTED OUTPUT AND CONTRIBUTION**

With the implementation of this study project in Republic of Nauru, the Government in Nauru will take practical experiments and part of solution for improving local people's ICT literacy and activities as very far away from Internet connectivity, and then Nauru will step up pilot through nationwide projects based on this result of this pilot ICT Resource Center. With the actual installation, training and practical evaluation, Nauru will be able to go forward to make strategy and plan for deployment in order to improve the quality of life and to encourage people lean itself.

Resource Center will be installed to renovate the old telecom building by Nauru government. And we will study the national strategy for ICT with MIC Japan. our most significant challenge will be installation of Optical Fiber as part of G-LAN(Government LAN network) for broadband networking.
On the other side, PCs and servers were already prepared some numbers by their department such as school by Education, hospital by Health, Servers by DICT.
Afterward, based on our APT J2 project, Nauru government will try to get budget for nation wide backhaul network by Optical fiber

3. General Information of Republic of Nauru

Following is refer to REPORT ON THE APT ICT EXPERT MISSION

Subject: TO STUDY THE CURRENT STATUS, KEY SUCCESS FACTORS AND SUSTAINABLE MODELS OF ICT DEVELOPMENT PROJECT IN THE REPUBLIC OF NAURU

Duration: September 1 to September 14, 2012

The Republic of Nauru is an isolated small island country located in the western Pacific Ocean, 60 km to the south of the Equator. Its nearest neighbor is Banaba Island in the Republic of Kiribati, 330 km to the east. This unique location has created important natural resource of Nauru. Migratory bird droppings formed guano, “phosphate deposits”, over a long period of time. Phosphate deposits were mined by the British, German and Australian interest.

Economy of Nauru had been almost depended on the results of phosphate mining industry until the deposits were exhausted in the late 1980s. Nauru did not prepare post-phosphate industry. Therefore, the country has suffered serious economic and financial crises around the turn of the century.

Telecommunications and information industry had also deeply affected by these crises as we analyzed in this Expert Mission Report. By these special characteristics, Nauru is obviously very different from other Pacific Islands countries. When we organize ICT project in Nauru, we should take into account the uniqueness of this country. Department of Information, Communication and Technology (DICT) under the Minister for Telecommunications are now in the process of establishing the National ICT Center. The National ICT Center consists of ICT Resource Center and Government LAN (G-LAN).

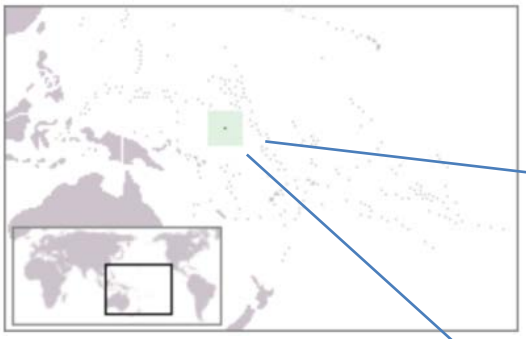
A-1. Location and Land

- The Republic of Nauru is an island country located in the Micronesian Region in the western Pacific Ocean, 60km south of the equator.
- Its nearest neighbor is Banaba island in the Republic of Kiribati, about 330km to the east. Its other bordering neighbors are Marshall Islands to the north and Solomon Islands to the south.
- Nauru is one of the world’s smallest nations consist of one small island. Total land area is 21.square kilometers. It is 6 km in length and 4 km in width.
- The island is surrounded by a coral reef. The reef is bound seaward by deep water, and inside by a sandy beach.
- The highest point of the plateau is 65 meters above the sea level.

A-2. **Population and Language**

- Nauru's population is approximately 10,000 (UN, 2010) or 9267 (CIA-2010 est.). About 7500 are indigenous Nauruan and the remaining 2500 are non-Nauruan.
- Over 80 years of phosphate mining caused about two thirds of the island to become un-inhabitable. People are mainly living on the coastal fringe as the central plateau has been badly affected by the mining.
- The official language is Nauruan. English is also widely spoken through necessity due to Australian and other British Commonwealth cultural contact.

Figure x. Location and population



From Bird view, white line at left is the airport

Motto: "God's will first"	
Anthem: *Nauru Bwiema* "Nauru, our homeland"	
	
Capital	Yaren (*de facto*) [a]
Official languages	Nauruan (native) English (widely spoken)
Demonym	Nauruan
Government	Non-partisan democracy Parliamentary republic
- President	Baron Waqa
- Speaker of the Parliament	Ludwig Scotty
Legislature	Parliament
Independence - from UN trusteeship, (from the United Kingdom, Australia, and New Zealand)	31 January 1968
Area - Total	21 km² (239th) 8.1 sq mi
- Water (%)	0.57
Population - October 2011 census	10,084[1] (234th)
- Density	480/km² (25th) 1,243/sq mi
GDP (PPP) - Total	2006 estimate $36.9 million[2] (192nd)
- Per capita	$2,500 (2006 est.) [2] $5,000 (2005 est.) [3] (135th–141st)
Currency	Australian dollar (AUD)
Time zone	(UTC+12)
Drives on the	left
Calling code	+674
ISO 3166 code	NR
Internet TLD	.nr
^ Nauru does not have an official capital, but Yaren is the largest settlement and the seat of parliament.	

Nr.	District	Former Name	Area (ha)	Population (2011)	No. of villages	Density persons / ha
1	Aiwo	Aiue	110	1,220	8	11.1
2	Anabar	Anebwor	150	452	15	3.0
3	Anetan	Añetañ	100	587	12	5.9
4	Anibare	Anybody	310	226	17	0.7
5	Baitsi	Beidi, Baiti	120	513	15	4.3
6	Boe	Boi	50	851	4	17.0
7	Buada	Arenibok	260	739	14	2.8
8	Denigomodu	Denikomotu	118	1,804	17	15.3
9	Ewa	Eoa	120	446	12	3.7
10	Ijuw	Ijub	110	178	13	1.6
11	Meneng	Meneñ	310	1,380	18	4.5
12	Nibok	Ennibeck	160	484	11	3.0
13	Uaboe	Ueboi	80	318	6	3.0
14	Yaren	Moqua	150	747	7	4.0
	Nauru	Naoero	2,120	10,084	169	4.8

A-3. Brief History and People

- Nauru was originally settled by the Melanesians and Polynesians which are the part of Lapita people's "World Greatest Exploration" originated from Taiwan and the Pacific coastal part of mainland China to the Pacific Islands areas via South-East Asia at least 3000 years ago
- .The first European to visit Nauru was a British whaler in 1798, followed by other whalers needing to replenish supplies.
- The Germans who had significant local involvement in the nearby Marshall Islands Protectorate annexed Nauru to become part of this protectorate.
- At the start of the 20th century, Germans, in combination with a British company, began mining phosphate.
- In 1914, during the First World War, Australian troops occupied the island.
- Post World War II period is characterized by a heavy regime of mining, overseen by Australian interests.
- The nation was granted independence in 1968 as a member country of the British Commonwealth.

A-4. Economy and Industry

- Nauru held valuable deposits of phosphate that were mined by the British, German and, later, Australian interest. Economy of Nauru had been almost depended on the results of phosphate mining industry until the deposits were exhausted in the late 1980's.
- In the middle of 20th century, Nauru enjoyed as one of the wealthy nations among the Pacific Islands countries.
- However, the small island was devastated by the process of strip mining with continuous sufferings from environmental consequences.
- In 1989, Nauru appealed to the International Court of Justice to compensate for the damage from almost a century of phosphate strip-mining by Australia, British and other foreign companies. In particular, Nauru made a legal complaint against Australia's failure to remedy the environmental damage caused by phosphate mining.
- In 1993, Australia offered Nauru an out-of-court settlement of 2.5 million Australian dollars annularly for 20 years. New Zealand and the UK additionally agreed to pay a one-time settlement of $12 million each.
- Declining phosphate prices, the high cost of maintaining an international airline, and the government's financial mis-management combined to make the economy of Nauru collapse in late 1990s. By the new millennium, Nauru was virtually bankrupt and became dependent on foreign investments and aid.
- From 2002 to 2008, the Australian Government paid Nauru substantial amounts of money to allow the establishment of a refugee detention center to process refugees

arriving by boat at Australian shores. This caused many troubles because refugees were wishing to go to Australia.

- In 2005, Nauru Government established "National Sustainable Development Strategy (NSDS)". However, due to the luck of financial resources, all strategic items, except education sector, were left in vain.
- At this time of APT Expert Mission's research activities in September 2012, Australian delegation has visited Nauru to consult with Nauru Government on the re-establishment of refugee detention center. This might be a controversial matter for Nauru. However, financial assistance might be an important factor for Nauru.
- From observations of APT Expert Mission this time, it seems that Nauru Government and people have no idea and vitality to develop alternative new industries on this small island except the active efforts of the Department of Information, Communication and Technology at Ministry of Transport & Communication.

A-5. Government

- Constitution of Nauru was adopted on 29th January, 1868 and declared the country as a sovereign Republic. The first Parliament came into existence on 31st January, 1968.
- Parliament of Nauru consists of 18 Members elected from eight constituencies for three-year terms from the date of the first sitting of Parliament. Members of Parliament are directly elected by the people of Nauru.
- Executive branch of Government comprises the President, who is also the Chairman of the Cabinet, and five other Members of the Cabinet.
- The President is elected by Parliament, and he appoints the Members of his Cabinet from among the Members of Parliament.

A-6. Telecom and Information Industry

- Modern telecommunications services were started in 1970s as a government monopoly services by using Intelsat satellites. Situations were almost common among the Pacific Islands countries.
- Telecommunications services were provided by Nauru Telecom as a government monopoly services until 2009.
- Telecommunications services in Nauru were evaluated very poor. The lines were installed in the 1970s. Dial-up access to the Internet was unreliable and expensive. In addition, people have been suffering from daily power cuts happening very often even today.
- The government is the regulator and was used to be the provider of all telecom services in Nauru. However the broader state of telecommunications in Nauru resembles the country's own economic chaos. In 2003 the telephone system collapsed due to equipment

failure leaving the island cut off from the rest of the world. By late 2003, Nauru could not afford to have its telecommunications repaired and in 2004 satellite communications were to be shut down for non-payment of subscription fees.

- According to ITU Statistics, from 2005 to 2008, numbers of fixed telephone subscribers were constantly 1800 (nearly 18%).
- In 2009, numbers of fixed telephone subscribers were 1900.
- In 2010, suddenly numbers of fixed telephone subscribers became "zero".

A-7. Transition **from Nauru Telecom to Digicel**

- In June 2009, Government issued mobile telephone (GSM) and Basic Internet Access Service licenses to newly established Digicel Nauru Ltd (Digicel). Government also assured monopoly telecommunications service provider's status to Digicel for two years.
- In August 2009, Digicel started mobile services.
- In October 2011, numbers of mobile subscribers reached 6,600 (66%).
- Digicel did not utilize existing telecommunications facilities of Nauru Telecom including earth stations and constructed its network and facilities by themselves.
- At the time of Expert Mission's visit to 'former' Telecommunications Center of Nauru Telecom, we found that all telecommunications related facilities were destroyed.
- Only one earth station were used by Nauru TV and Radio Nauru which are government owed public broadcasting system.
- 'Digicel' is a Caribbean based mobile telecom carrier. After the success of mobile business in Caribbean region, Digicel entered into mobile communication market in the Pacific islands countries in 2006 and expanded its businesses into several Pacific Island countries.

A-8. **Government Policy on De-regulations**

- Two years' monopoly status of Digicel has ended in 2011.
- Government has decided to introduce competition step by step basis. First step was to issue a new license to Cenpacnet Inc. (Cenpacnet) for Basic Internet Access Business Service.
- Before 2009, Cenpacnet had operated an Internet Café at Civic Center. As government gave monopoly status to Digicel, Cenpacnet was obliged to stop its operation.
- Now Cenpacnet has re-opened the Internet Café by using Digicel's access network.
- Next step for Cenpacnet is to set up two earth stations and acquire its own international access capacity and compete with Digicel for providing international Internet access lines to business users including government.
- When APT Expert Mission visited Cenpacnet office at Civic Center, one earth station has already set up and was testing with its Australian partner Pacnet using Intelsat-18

satellite. Cenpacnet is going to set up one more earth station which will be used with another partner in Hong Kong or Singapore using NSS-9 satellite or Astar satellite.

A-9. ICT Policy and Implementation

- At this stage, Nauru has no National ICT Policy nor Strategy.
- However, since Mr. Geoffrey Harris succeeded the position of the Director for the Department of Information, Communication and Technology (DICT), He has been very active in organizing reform and innovative ICT related activities.
- With his powerful leadership, he has integrated government ICT networks (G-LAN) which were separated ministry by ministry until recently. He put G-LAN network under the management of the DICT.
- Further steps for better G-LAN are:

  - To integrate school's computer laboratories and health centers network into G-LAN for secure operation and broadband access to the Internet,

  - To save cost by stimulating competition between ISPs. At present, Digicel is providing 3 Mbps international access capacity to G-LAN (2 Mbps as down-link and 1 Mbps as up-link).

    Cost is 16,000 AU$ per month.
  - To expand capacity from 3Mbps to 8Mbps (or more)
    Evaluation of this price by DICT, this is an extraordinary high.
    Cenpacnet is negotiating with DICT to provide 5 Mbps at same price.

- Ultimate goal of reform activities of DICT are the establishment of the National ICT Center at next building of the Government House.
- "Resource Center" in proposed J2 application to APT by Nauru will be a core part of the National ICT Center.
- Resource Center will be opened to people who wish to learn ICT literacy, effective and efficient use of ICT in various fields, and especially, to educate and train promising young leaders to become ICT specialists.
- However, there are many subjects to be challenged for secure and stable operations of the G-LAN and ICT systems. These are:
  - To protect G-LAN and ICT systems from unstable power supply.
  - To strengthen Anti-Computer-Virus activities for the safety operation, and
  - To protect G-LAN and ICT systems from outside cyber attach.

- Mr. Geoffrey Harris has proudly explained to APT Expert Mission that 300 new PCs together with printers will be distributed in public sector and the Internet connection of government network will be upgraded within this fiscal year.
  - 100 PCs to government offices,
  - 200 PCs to schools and hospital/health centers, and
  - Internet connection will be upgraded from 3 Mbps to 8 Mbps(TBD)

A-10. **Fore past Telecom Building**

Fore past telecom building is located very close by DICT building as it is ruins after the bankruptcy of previous Telecom in 2003.

- At moment, building is rather broken such as no roof, broken walls and dirty floors with gavages.
- Digicel has exclusive privilege to use the tower at side of building as mobile and other telecommunication. Other facilities were broken and kept as they are.
- Landowner of this space will want to keep in use for related of telecom (ICT).
- Because no more telephone/fixed lines and services, G-LAN must be used the old cupper pair cables for connecting government offices and buildings, from the old and broken room. No choice of other methods.
- As you see the photo at distribution frame room, you can image how bad of characteristic of ADSL.
- These pair cupper wire cables were installed in 1960s or '70s by Japanese company with cupper cables made in Japan.
- Fundamental structure of this building is still good shape and it is considered to be able to be renovated without big cost. Under discussion, we expect this building will be planned "ICT Resource Center" with renovation.

Fore Past equipment room

Distribution Frame for The copper wires

Remain 3 antennas, one using by media

International exchange room in past

Some years ago, Kids fired the building

A-11. **Existing Telecom cable**

By using existing fore past telecom cupper pair cables, Nauru government can be connected government offices as G-LAN. However, electric characteristic of this old telephone line cable is not providing proper speed and bandwidth as you see the current status in the photos. Therefore, staffs such as revenue office must often go to treasurer department office and re-input those financial data.

Below photo are the point of connection between underground and electricity pole. Nobody has not and cannot maintain such infrastructure.

Relay point between underground parts

Right black cable is connecting with one of left cupper wire for G-LAN. Right cable is going up the Civic Centre.

4. Activities timeline of our APT J2 project

To date (on January 12, 2014), we had the APT expert mission in September 2012, proposed this project and the selection of this project by APT in March 2013, kickoff meeting/Site survey in September 2013) and then Tokyo meeting on December, and now are prepare the procurement and fix the detail s..

Also, we discussed about such as future network and resource center beyond APT J2 project but in conjunction with our J2 project in order to reducing and sharing the expense of whole ideal plan in Nauru.

Activity	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan.	Feb,	Mar.	Apr	May	Jun	Jul	Aug
Selection																		
Preparation																		
Kickoff and Survey																		
Design and Procurement																		
Shipping																		
Installation/Evaluation																		
Report																		

5. Kickoff and Study in Nauru in September, 2013

1. Kickoff of this APT J2 Project

   Meeting Date: September Sep. 16 through Sep. 25, 2013

   Venue: Nauru

   Participants:

   Nauru: Mainly DICT (Chief: Mr. Geoffrey Harris: Director)
   Each Department of Government of Nauru
   Representative of relevant Schools, Hospitals

   Japan: Mr. Uchiyama/ KDDI foundation

   Agenda: Review the proposal
   Understand the current situation and status as well as desire and requirement
   Discussion about system design and work flow
   Discussion of Tokyo meeting and research in detail
   Fixing rough general schedule refer to the procurement and shipping schedule
   Site survey of each place and organization, relevant to the project
   Courtesy visit and discussion

2. Research of current situation and status in Nauru

   Study and discussion below issues;

   1. National ICT policy and plan
   2. Resource Center (ICT Center connected the G-LAN: Government-LAN)
   3. Reliable and sustainable broadband G-LAN
   4. Practical pilot installation of optical fiber cable and where
   5. Skilled people for ICT technician and engineer
      (1) Optical fiber cable installation and repair
      (2) Operation and maintenance of high speed and broadband LAN
      (3) Interfacing between broadband G-LAN and slow/narrow Internet into outside
      (4) Deployment of G-LAN in nationwide/island in future
      (5) Installation/operation/maintenance/Administration of Server and its applications
      (6) ICT Consultation in island (nation)
      (7) Improve Internet connection situation in Nauru, strategy of competition

3. Discussion about activities with time line and items in detailed

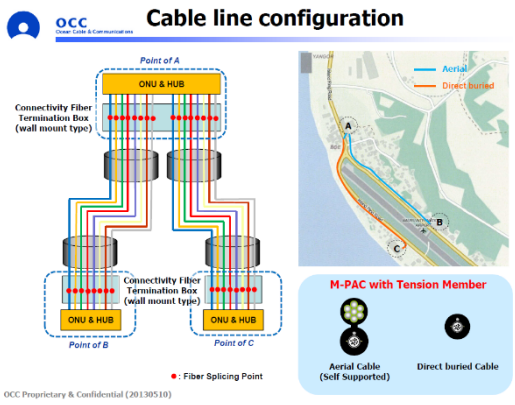
   1. Study ICT national strategy comparing with Japanese strategy
   2. Replacing old and dilapidated cupper wire to optical fiber cable
   3. Department of ICT in Nauru government, taking all responsibilities in government ICT, including installation/operation/maintenance/repair even of PC as well as LAN and servers

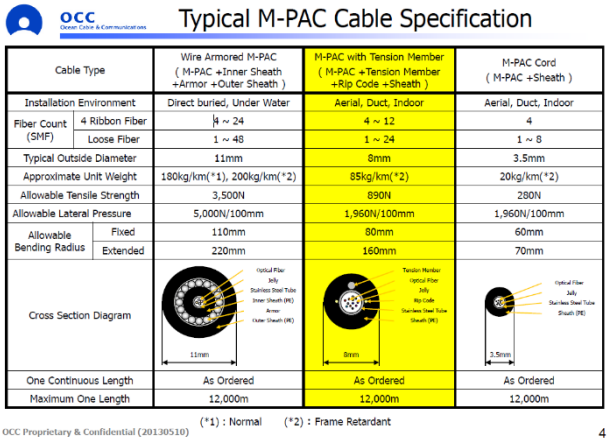
4. In and after the kickoff meeting. The Government of Nauru (Ministry of Communication) was preparing the extraordinary budget for (1) building of the resource Center and (2) optical fiber cable for future deployment into nationwide.
5. Cooperation with other government organization, such as Power utility (for construction of optical fiber cable), other government offices (for support of pilot end users about interfacing internal /external coordination)

4. system design and work flow

After study and discussion regarding improvement of quality of Internet situation;

1. With 1st priority, stable, reliable and broadband by optical fiber networking in G-LAN replacing old, unstable, unreliable cupper wire
2. However, nobody know such optical fiber and such high speed networking in Nauru. Therefore, in parallel, human resource development definitely required
3. Focused on practical installation of optical fiber network by DICT herself, also required how to save the money for construction of fiber cable (Civil Engineering and outsourcing of ICT related) by DICT/Nauru government due to limited budget of J2
4. Selection of optical fiber was “M-PAC” deferent of regular optical fiber
5. Two methods (Aerial and direct buried) by one type of cable
6. Establishing Resource Center building by Nauru government
7. Pilot end-users (government offices) required biggest effort and appeal with big support
8. Considering pilot installed network and then deployment of nation wide
9. Considering improvement of national ICT policy and strategy by Nauru government





5. Tokyo meeting and study

Discussion was below

1. Target date of Tokyo meeting and study
   - ① December, 2013
2. Items of study and visit
   - ① General optical fiber cable and M-PAC
   - ② National trend in Japan
   - ③ others
3. Preparing data and information for decision
   - ① End user, cable route and import

6. Site Survey

(1) Current room for DICT including servers and work space

Existing servers and security at government LAN and servers



(2) Internet gateway at Cenpac network

Due to monopoly of Internet service provider, focused on Cenpac as gateway of Government LAN (CIVIC CENTER)


(3) Old Telecom building in ruin

Considering new location of the resource center at old Telecom building to be renovated

(4) End users

Requesting Nauru to decreasing connections in order to be under APT budget; selection in below locations

① Government building
② Cenpac office at Civic Center
③ Revenue office at Civic Center
④ High school
⑤ Fire station
⑥ Police station
⑦ University of South Pacific
⑧ Elementary school
⑨ Media center
⑩ National Central Hospital
⑪ College
⑫ Health Center
⑬ Airport building
⑭ Power utility
⑮ Port Authority
⑯ Others for future connection

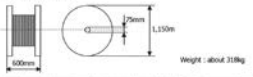
(5) Others

Cable route and laying method (Aerial or Underground)

Tool and machine for construction/laying (truck and heavy machine)

Saving construction fee

Required items to laying an optical fiber cable

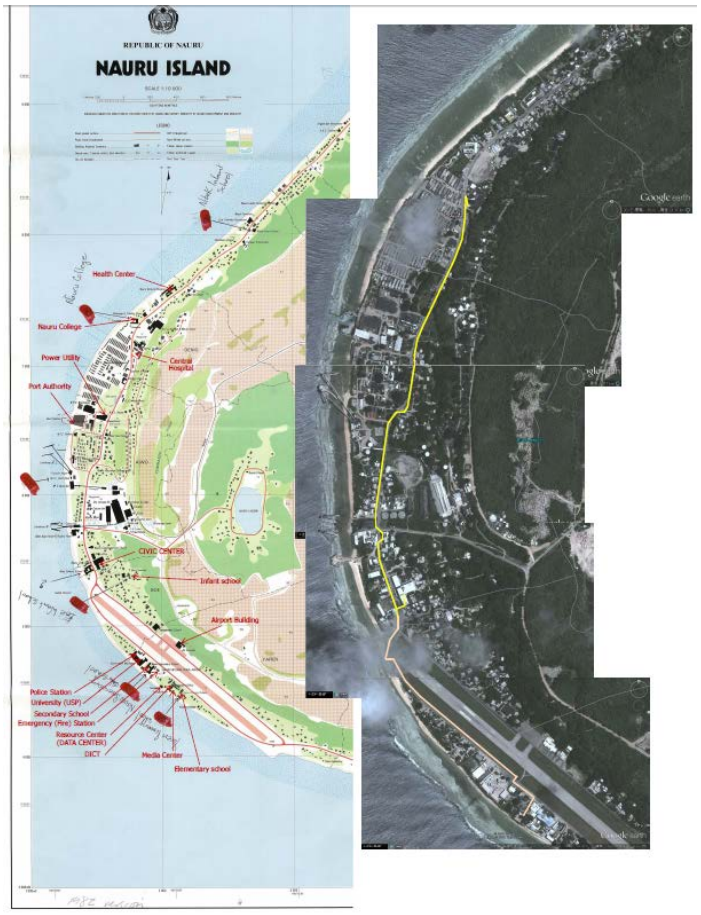
No.	Item	For	Note
1	Drum Jack	Cable Drum Supply	(1) Sample of drum jack with cable drum.  (2) Structure and size of the drum.  Weight : about 318kg
2	Temporary support hardware	Cable support at pole	(1) These hardware is used to pull the cable up to the pole. Bend limit at a curve is over 300mm in diameter.  Cable Block Cable Guide

7. Result

With Mr. Uchiyama of KDDI foundation, Mr. Geoffrey Harris, director of DICT as chief of this project mutually understand the current situation and desire/request, review the proposal, discussed regarding optimizing this project in detail and took the survey the each site where we concerned and was related. to our project and future.

After discussion, we decide some modification of the project, such as the site, in order to optimize the accomplishment and collaboration with other project, effectively;

1. Low priority of the site of airport building due to be installed WiFi.
2. Due to fire of the Nauru Central Hospital and burn the whole patient data, high demand of the site at renovated Central Hospital and relevant health center
3. Nauru government recently put the budget for renovation of the telecom building for our project



Modification of the route of fiber cable

6. Discussion and Study in JAPAN in December, 2013

Discussion

Meeting date: December 6 through December 18, 2013

Venue: Tokyo, Yokohama, Kawasaki, and Tochigi in japan

Participant:

Nauru: Mr. Geoffrey Harris/DICT in Nauru

Japan: Mr. Yosuke Uchiyama/KDDI foundation

Supported by

MIC Japan

OCC

KCS

Agenda: Study ICT strategy in Japan and situation

Study of Fiber submarine cable

Study of Fiber cable for terrestrial

Review the result of kickoff meeting

Discussion of Fiber network design for G-LAN

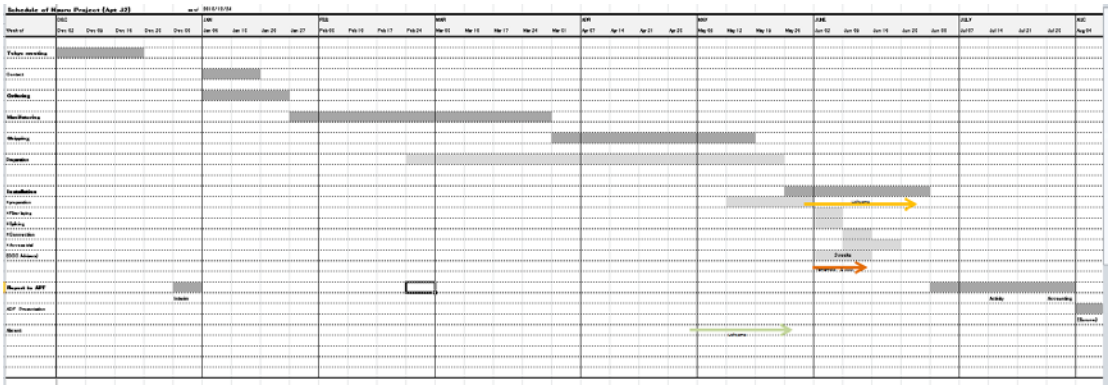
Discussion of procurement and shipping

Technical study in Factory of fiber cable for terrestrial

1. MIC JAPAN (Courtesy visit and ICT policy/status in Japan)
2. Study of Fiber Submarine cable
3. Discussion of fiber cable and installation
4. Technical visit at Fiber cable factory
5. Discussion of activities and budget constraint
6. Discussion of procurement and expense
7. Discussion about design of Fiber Government LAN
8. System construction and practical installation
9. Installation and evaluation phase including shipping limitation

After discussion of system design with procurement and shipping schedule, we agreed following tentative schedule and system (network design):

Figure 4. Agreed tentative schedule at Tokyo meeting



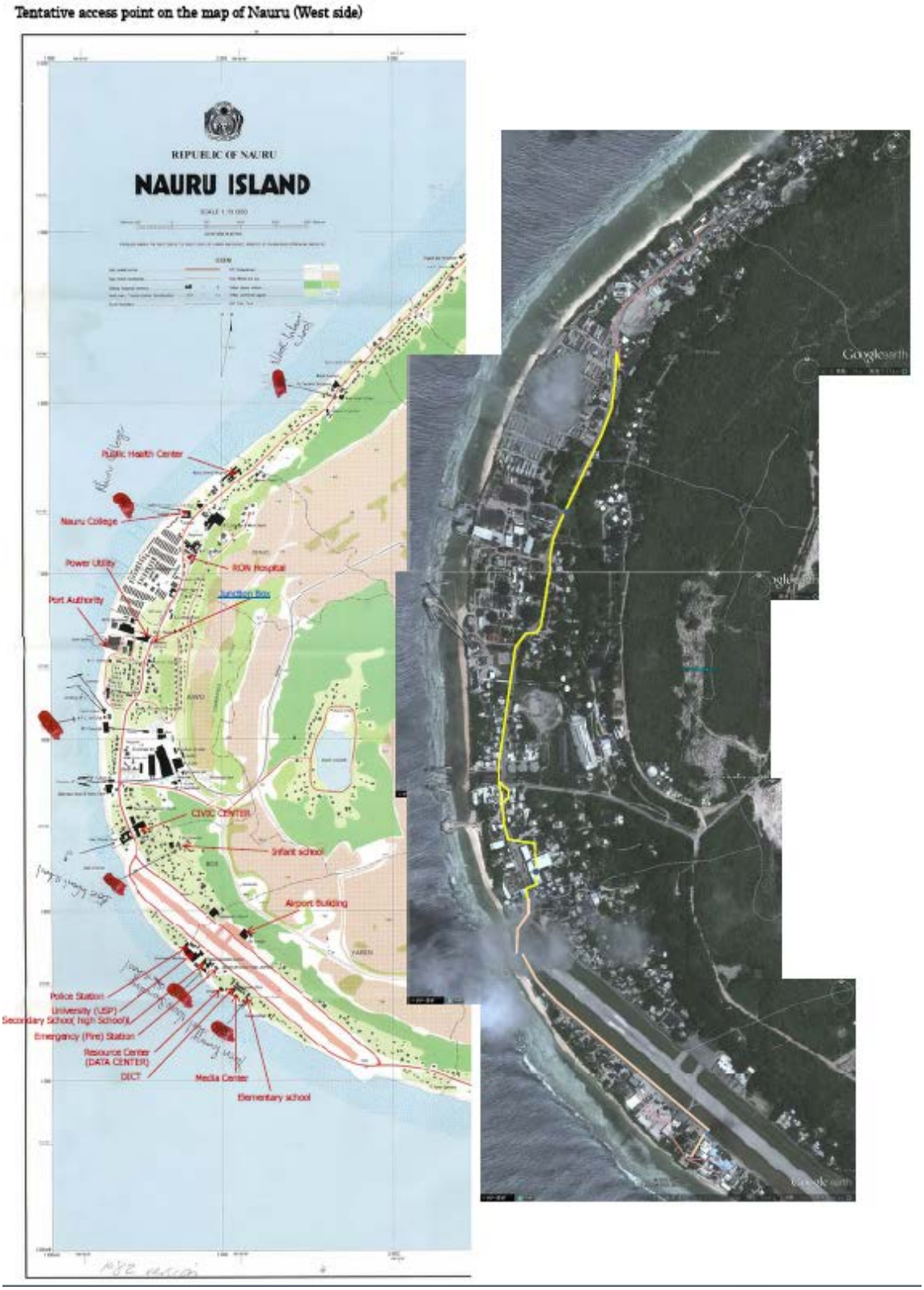
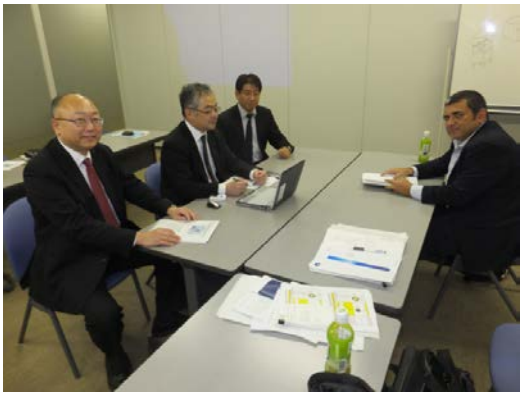


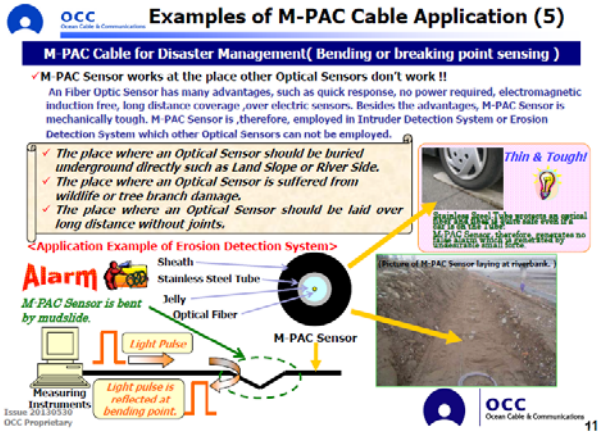
Figure 5. Rough route of the fiber cable for G-LAN

Study and courtesy visit

OCC in Yokohama Head Quarter

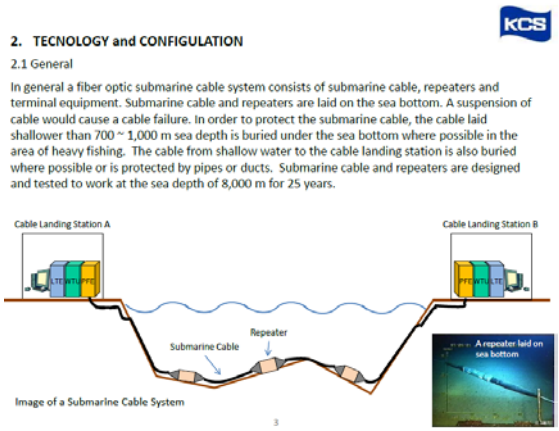
Study and discussion regarding M-PAC optical fiber cable, available method of construction, preparation for laying optical fiber cable in detail.

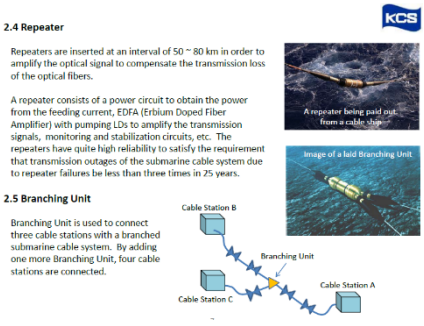


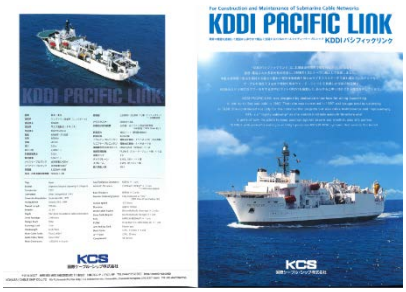


KCS in Kawasaki

Study of submarine optical fiber cable and how to implement the cable in view of technical and protocol

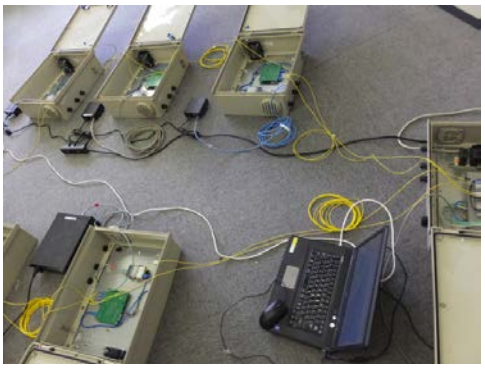


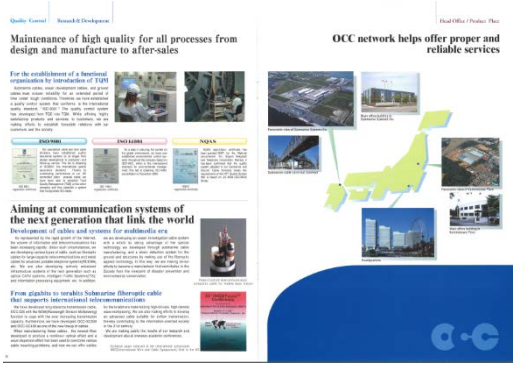




Factory and research in QCC Tochigi

See actual manufacturing of M-PAC fiber cable, and see the demonstration of auto routing equipment



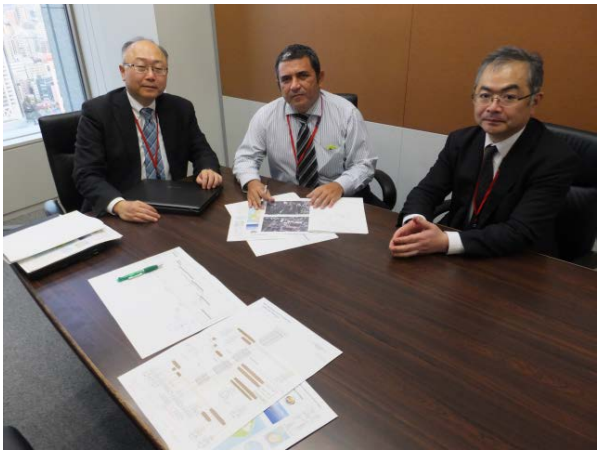


Study and discussion at Ministry Interior and Communications

Courtesy visit at MIC Japan and study of National policy for ICT development

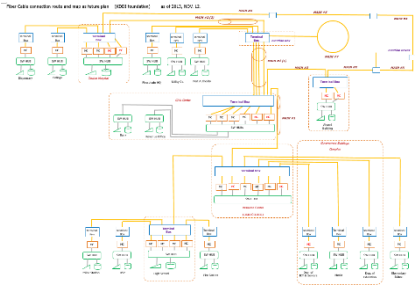
Discussion at KDDI foundation

Discussion for preparation, process, schedule and layout of installation in Nauru



Cable route (Aerial/Underground)

Connection



Together with APT Training course (Rural Communication)

In middle of the stay, participation of the APT training course of rural communication because one member was lector of this trading course.

7. Installation and Evaluation of fiber G-LAN system in Republic of Nauru

Our initial plan to be installed optical fiber cable was completion during July trip to Nauru, however, there were coming several issues to be resolved during installation. So, we had to have two trips from Japan and asked DICT to continue to deploy the connection by themselves.

1. Preparation

Procurement

Cable and construction tool & material: procured in Japan

M(32/36) 24SM-TFR-SSD(22) 6,000m

Tools and clasps

Fusion Splicing machine and OTDR: procured second hand in Japan

Fujikura FSM-40PM x2set, Yokogawa OTDR AQ7260 x1set

Media Convertor (1Gbps): procured in Australia

Single mode (1Gbps duplex): (Dual x2) x5set & (Single x2) x2set

Truck and machine for construction: prepared in Nauru by DICT

delivered by cargo ship

Shipping

Export process in Japan (Fusion Splicing Machine: applicable specification)

Required special consideration to export

It took some extra days to confirm to allow to export the Fusion Splicing machine

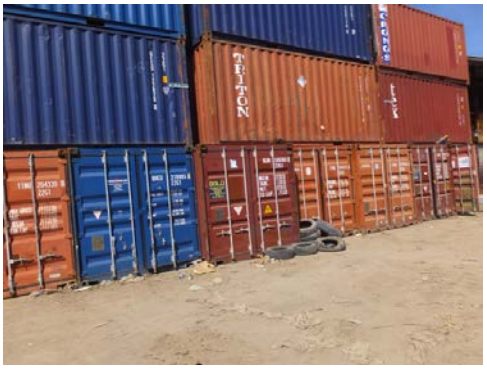
Shipping Optical fiber cable and clasp By Cargo ship

from Yokohama – Australia - Solomon – Nauru

Import TAX exemption process by DICT

Arrangement of delivery from the port to the DICT location

* Due to delay of arrival (about 2 weeks behind expected, and Ship can't dog the port) and lack of heavy machine for delivery to DICT from the port, we had to arrange it with several staffs and organization to pick up.



Finally, we found the imported stuffs in the port backyard.

2. Installation of Resource Center

The Nauru government ordered to renovate the old telecom building as ruin for new Resource Center, while ago. We expected it was done before installation in July 2014 (expected 2-3 weeks but even 2-3 months, it just began). Actually the completion of renovation was after February 2015 installation phase. At present in August 2015, the Resource Center was opened and under operation with optical fiber network.

1. Government servers room
2. Government network equipment
3. Staff room for DICT
4. Training and lecture room
5. Work room and storage

In July 2014

in February 2015

View of Resource Center

Resource Center renovation and Movement of DICT to Resource Center was done by the expense of the Nauru government.

3. Internet connection

At the time of beginning of this project, Internet speed was so slow and high charge by monopoly. In proceeding this project which mean that G-LAN was extremely became high speed (order from Kbps to Gbps), and focusing on the government owned ISP, Situation of the Internet connection in Nauru was improved so much of cost and speed by completion pricing and etc. Internal G-LAN is now reliable, stable and so high speed, right now. Even Broadband Internet connection into outside with inexpensive charge is future issue

4. Installation of Optical Fiber cable

The practical pilot installation of optical fiber network in G-LAN was high light in the Nauru as well as one of purpose of this APT J2 project.

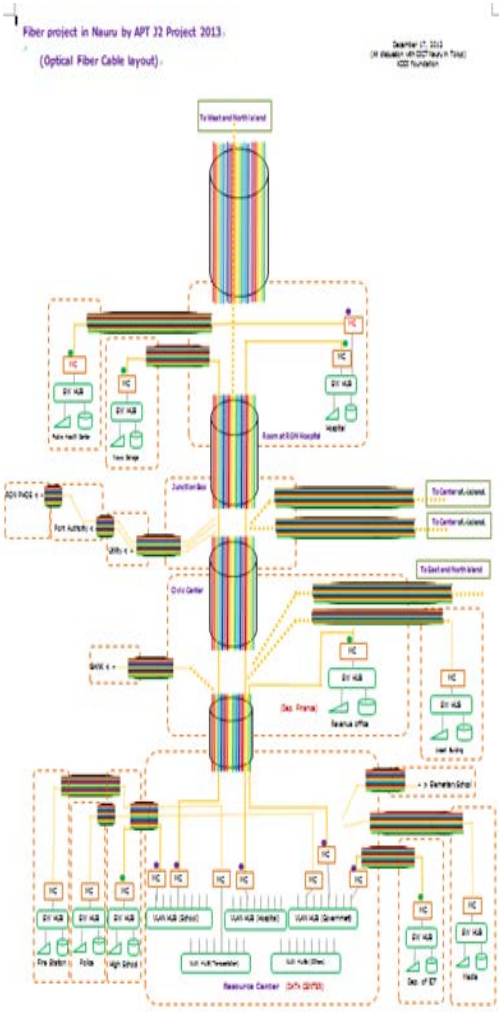
At the beginning of the installation, nobody in Nauru knew the optical fiber construction and its knowledge/practice, and there were no machine dedicated of the laying/implementation of optical fiber cable in Nauru. Also, DICT, one of Nauru government body, took place this ownership and actual work by only staffs of government in this APT J2 project.

Kindly, OCC, the Japanese optical fiber cable company, supported this project to dispatch the technical engineers without labor fee and applied special discount.

1. Cable route and connection

1. Connection

In considering future expansion and additional connection of the G-LAN, Hub site and junction box in this J2 project were decided:



Hub site: Resource Center, Cenpac machine room, RON hospital

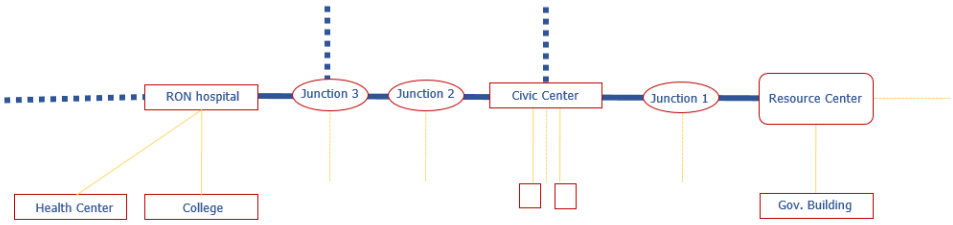
Junction box: Between RON hospital and Civic Center, Between Civic Center and Resource center

Due to limited budget, in this J2 project, 10 purchased media converters for 5 links were used two fibers for 1 link (2set/1link), and 2 purchased media converters were used 1 fiber for 1 link (2 set/1link). Therefore, in future, it will be replaced from 2 fibers media converter to 1 fiber media converter (2 fiber media converter is used single wave length, 1 fiber media converter is used double wave length (WDM)).

This M-PAC (Optical fiber cable) contained 24 fibers inside and attached iron-wire messenger for attached onto electric pole. This M-PAC cable can be used for aerial (attached electrical pole) and also used underground.

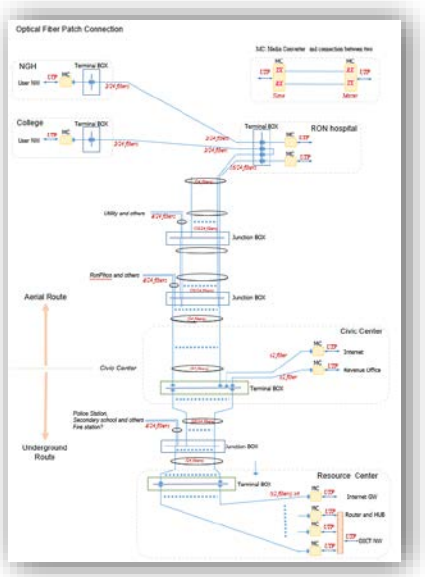
2. Route

Based on above condition of connection, the cable route is shown as below figure:



- Blue bold line is main route
- Yellow thin line is access line at the end user
- Resource center is main center as star connection at the present
- Hub sites are Resource center, Civic Center and RON hospital, where main cable is into the site and it has distributing devices (Router, HUB or Server)
- Junction Box are located between Hub sites for easy to be connected the end user site
- Dot line is future expansion

Detail Cable route and connection



Construction method is identically two as below:

1. Between Civic Center and RON hospital

Because this route is on the main street in Nauru and it is impossible to dig the road with low cost, this route was decided to take Aerial construction method, which the cable was attached on the electric poles. It should be considered wind power strength into the fiber cable. That is why the M-PAC cable is added the iron messenger.

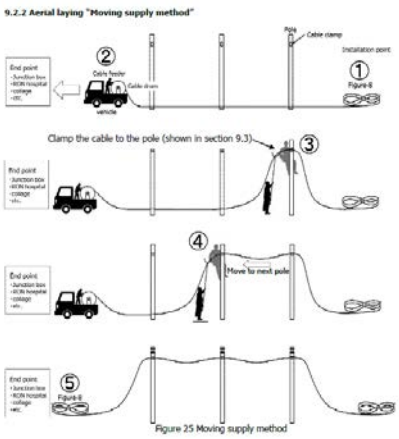
We hooked up the cable on 60 electric poles between them.





Aerial:

Optical fiber cable was fixed to be hook up at electrical pole. So far, it required the bucket car for put the cable at the high point of the electric pole.



Our method to hook up the cable

2. Between Resource Center and Civic Center

Because this route is side of the air strip where should not be build pole/tree. In addition, those old deteriorated cupper cable was buried under side of road. However we had to ask the electrical utility to support the heavy machine and staffs to hook up the fiber cable onto the electric pole. The electrical utility kindly agreed to support our construction, coordinated by DICT. Due to the ground in Nauru is so solid not to dig by hand, the heavy machine was required in priority. M-PAC cable which we did use was not required the standard fiber cable construction for laying underground. In this project, Optical fiber cable was buried in 10-100cm under the ground (average 50cm depth) without concrete cover above the cable. This construction was simple but we had to keep the route with some identification and document.

Under ground:

Digging trench and buried optical fiber cable under ground

Figure2 Tentative access point on the map of Nauru (West side)

8 Direct buried Cable Installation (from runway to Civic center)

8.1 Trench preparation

(1) Excavate the ground of the cable route and investigate ground conditions in advance.

(2) Trenching depth should be more than 30cm in general. If the place is affected by frost, a trench should be enough deep not to be damaged by frost.

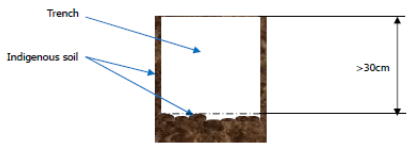


Figure 12 Configuration after trenching

(3) Bottom of trench may not be flat, so clean backfill soil should be put in more than 10 cm to in order to make bottom flat.

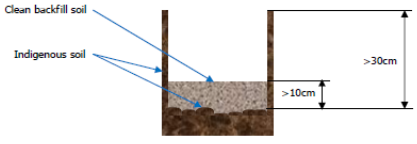


Figure 13 Clean backfill soil installation

3. Roll out the fiber cable from the drum

M-PAC itself is not heavy but in this project we add the iron messenger wire adequate for the length between electrical poles in order to protect with storm window pressure and some accident matters. Therefore, the total weight of the cable drum was more than 2,500Kg, that was rather heavy than we expected. So, we had to have the heavy machine and big truck to move the drum and to pullout the fiber cable from the drum.

And,

* Because the cable route was on the side of main road of Nauru (no detour), we could not stop the traffic.
* Our construction was not priority work with Electrical utility, we had to wait until their work completed.
* Due to recent accident, when we worked at the electric pole, we should cut the electric power down during the construction work. (Blackout from evening to mid-night in several days)
* Laying cable in the trench was easy and in short time, but digging trench by machine and back to bury as it was required several days with priority. However, we could not take machine and staffs everyday.
* There were many paths connected houses and main road on the route.

Anyway, we saved the heavy duty machine charge and workers' labor fee but it took many days and we had lots of local claims against slow construction.

We tried two method to roll out the cable from drum onto road.

1. Normal method: we made the big truck move slowly and pull the cable onto the road.

(1) Pull out and hook up cable in parallel (2) pull first and later hook up the cable

2. Pull the cable by the pickup truck from the drum at the fixed point

Above two method, each had benefit and risk. And, anyway, the most difficulty was nobody in Nauru worked such optical fiber cable construction (Aerial and underground, even pull out fiber cable).

We tried all methods depend on situation day by day. In initial construction, we had several problem and trouble (even several breaks of the fiber cable).

Finally at the end of this project we could take effective construction way in adequate period along with the Nauru's situation.

4. Temporary laying the optical fiber cable (crossing the road and put it on the side of road)

M-PAC cable has identical features compared with normal optical glass fiber cable.

(1) Light weight without supporting wire and its sheath
(2) Strong allowable tensile strength
(3) Strong allowable lateral Pressure
(4) Allowable bending Radius

We tried lay down the optical fiber cable crossing the main street, temporary during hooking up work.

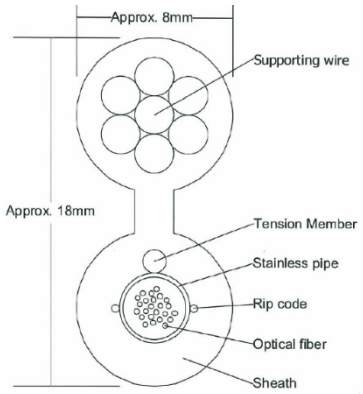
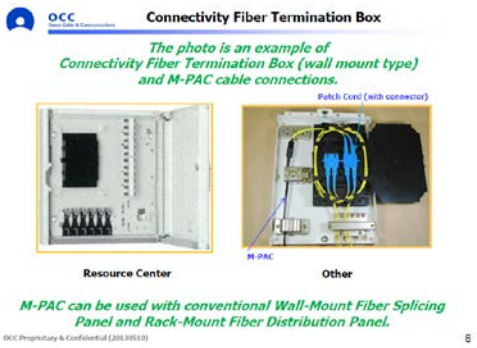
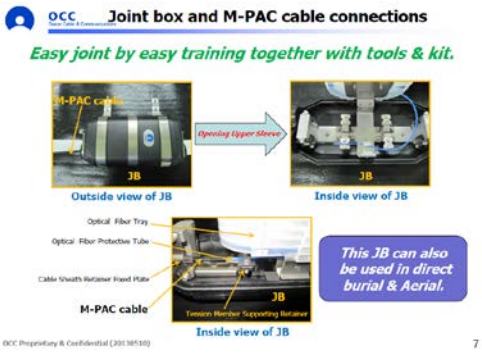
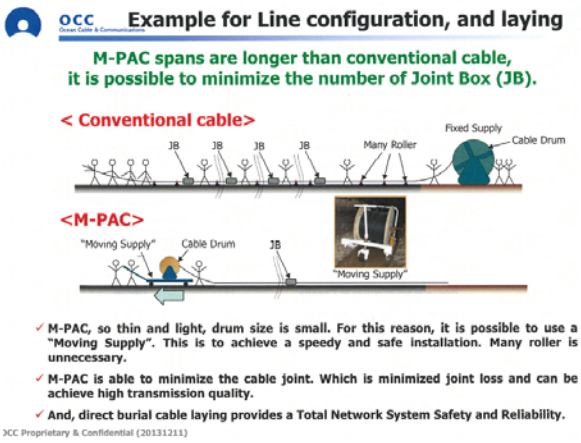
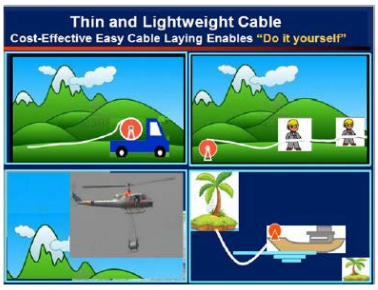


Figure 1 Cable structure (M(32/36)24SM-TFR-SSD-(22))









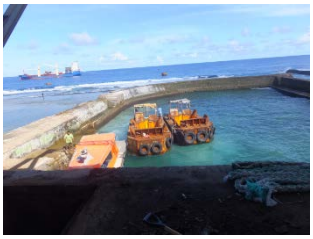
Under usual temperature, no damage even crossing the road, temporary we laid the cable on the road down, crossing the main road in Nauru.

Optical fiber cable on the road due to not stop the traffic during holing cable.

2. 1st phase of installation

In August 2014, in Nauru, DICT as leader of this installation together with KDDI foundation supported by OCC worked as followings along with planned network design;

(1) Checking the procurement and importing the stuffs with several paper work.



Bringing the stuffs by small boat from the cargo ship, long hours

Finally found the container not easy to find

Required machine from inside The drum was too heavy

(2) Aerial construction

Between Civic Center and Health Center, the distance was approximately 2210m with 4 junctions, 60 electric poles.

Cable between poles and hooking at pole should be as shown below figures by special cramps for fiber cable.

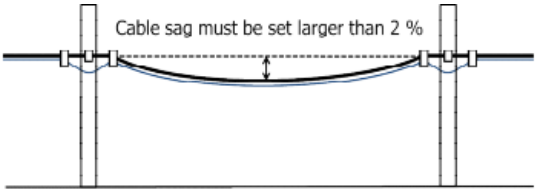


Figure 28 Cable sag

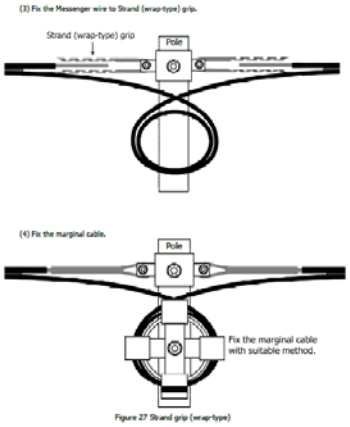


Figure 27 Strand grip (wrap-type)

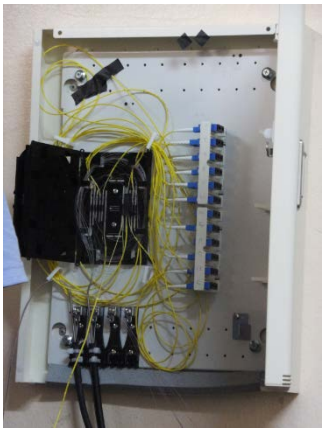
Roll down the cable

Fiber cable into building in rain

Because we should make electricity down for our construction

Hooking the cable at few meter down high voltage lines
in regulation

Due to limited time of truck rental
Roll down the cable on the road carefully seeing the small sharp stone



At Civic center, 2 fiber cables (24 fiber cores x2) were allocated in one terminal box.

Trouble at the 1st practice (broken all fibers)

(3) Underground construction

At 1st discussion with the electric utility, we agreed to work together with power cable and optical fiber cable construction together with same trench. However, because the power cable has not delivered in few days (actually even couple months later). According to the delay schedule, we asked the electric utility to dig the trench for only optical fiber cable. But the digging was not often stopped and delayed. We decided before the digging was completed we laid the optical fiber cable on road on the way from Government building to Civic center.

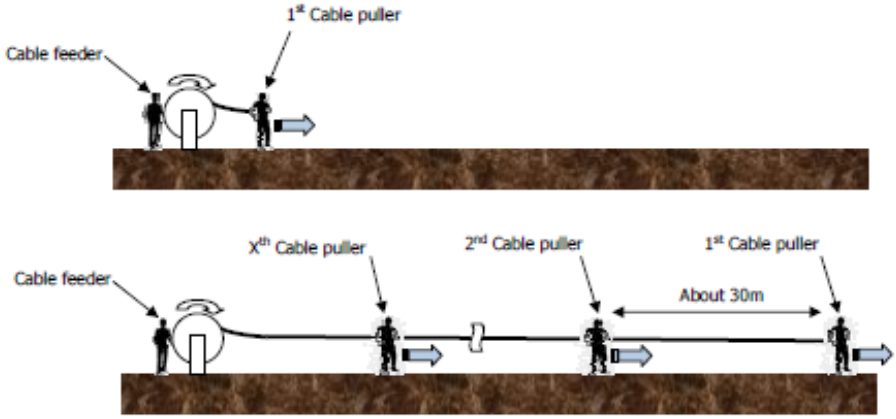


Figure 18 Placement of Cable feeder & puller

Temporary two points crossing the road were expected without problem. At rode side of air strip, it must be secured, another side of road was many paths to residential house and small sharp stones.

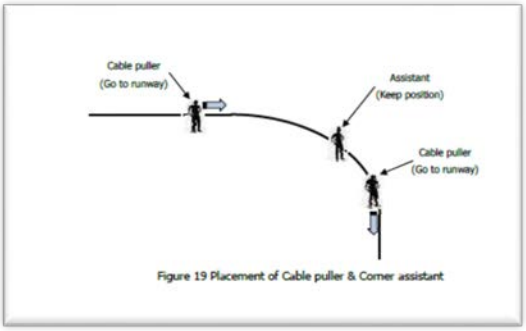


Figure 19 Placement of Cable puller & Corner assistant

Pull the optical fiber cable by pickup truck

Temporary laid on the road side
Right side is air strip, left side is residential

Laying the optical fiber cable among buildings

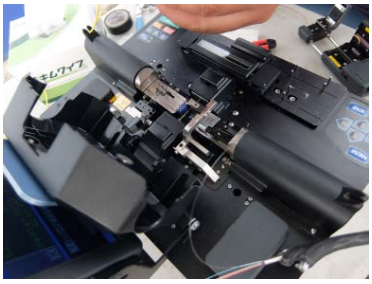
Digging and laid the optical fiber cable but not whole route.

Waiting completion of digging, but took lots of days. So, fiber cable was crossing the road at the windsock point and front of government building, we could not keep the trenches whole day.

2 day ago, in very hot day, we found cable was damaged due to high temperature and traffic.

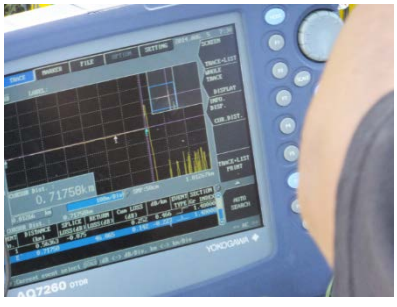
(4) Fusion splicing/housing fibers in junction box and measurement by OTDR

According to the optical fiber construction, definitely the fusion splicing is required to make network. In this project, we had not enough budget to buy the fusion splicing device. Therefore, KDDI foundation decided to donate the fusion splicing equipment and OTDR measurement instrument with limited budget. Machine price are so high to buy new one. Then, OCC kindly looked for secondhand equipment with low price. Finally, 2 fusion splicing machines and one OTDR as secondhand were found with reasonable price to be donated to Nauru. Actually, the Fusion splicing machine was so strong splicing capability not easy as usual to process paper work to be export from Japan.

Fusion splice at the field practice taught by OCC engineer (1st time in Nauru)


Learning how to make fusion splice with fibers, at the room and field

Measuring the length and break point by OTDR (filed check at fusion splicing point)

(5) Discussion for completion with solution of some remaining problem in next trip.

After passed schedule day,

Items “Not completed”:

- Burry the fiber cable between windsock and government building due to not completion of digging
- Moving into new Resource center building due to not completion of renovation
- Having issues to be resolved
  - Crossing the road in very hot day and laying on sharp stones
  - In pulling the cables, extruding other edge of cable
- End-to-end communication test (with end users)

Decision:

- We should make another trip to Nauru in couple months to complete network (after some other construction is finished) as 2nd phase installation.
- Nauru team would make pressure to constructor and utility to complete their work. And prepare to move ICT center in government building to new resource center. And Networking to end-users.
- Nauru team would keep watch the situation of temporary laying of optical fiber cable.
- Japanese team would investigate and make measure of trouble issues. (refer to 6. Trouble)

Here, we had several problem and issues to be resolved such like below;

1. Temporary laying optical fiber cable crossing the main street (especially high temperature near the specification)



2. Special Note/attention in temporary laying the M-PAC cable

Extruded another edge of the fiber cable. It made difficult to roll the cable down to ground

3. 2nd phase of installation (due to the delay and problem, we had 2nd trip for installation)

Half year later after 1st installation in Nauru, we had another trip to finalize the APT J2 project.

(1) Training of replay unit and discuss the solution of the trouble (ref: 6)

(2) Checked the fibers between Civic center and ICT center

① All fiber were already broken but all were fine to near police from civic center, measured by OTDR

② No problem the aerial fiber cable from Civic center

③ Resource center building was not complete yet

(3) Laying electric power cable from government EPS into Resource center

(4) Optical fiber cable would be cut at the front of police station, locate new junction box (supported by Australia refugee camp) at this point, and then lay the new cable (use part of procured cable for future use: no choice) between this point to the Resource center, make fusion splicing at the junction box at police station.

(5) APT J2 project should be completed after the optical fiber cable into Resource center. Later, after completion of renovation of Resource center DICT Nauru would made movement of ICT center in old room in government building, replacement of those connection of the optical fibers at the renovated building. (This was done August 2015, successfully, and now the connection is working fine and is deployed into other users.)

DICT negotiated with heavy machine staffs, Within one day from morning, they should dig the trench from police station to resource center, lay the cable into trench by DICT and participant and then burry the trench till completion even overnight. Actually, from early morning to mid-night, laying the cable (approximately 1420m) was completed. Following 2days, DICT team made fusion splicing with 3 fiber cables (to Civic center,, to Resource center and to police station) at the junction box in front of police station

Fusion splicing whole 2 days for 3 cables (24 fibers/cable)




4. Extend and deployment by DICT

During the APT J2 project:

Established by Budget of Nauru Government for procurement of new optical fiber cable in future use

Renovation of old Telecom building by Budget of Nauru Government

Relocated the server machine and network room for government ICT system into Resource Center

Couple months after completion of this APT J2 project (at the ADF meeting):

Resource Center for network aggregator of Governmental LAN Connection with; DICT, main government campus, Finance, Hospital/Health Centers and 2 Schools, Internet gateway to satellite, Police, and Electric Utility , already at ADF meeting.

Transportation, Media, Airport and University in future

Plan of connection with all government building in future (by the cable purchased by Nauru Government)

5. End-user access

In this J2 project, we decided to select below locations to be connected, which the offices of the Nauru government with full support

1. Resource Center (DICT machine room, temporary)
2. Civic Center (Revenue office and Cenpac as Internet gateway)
3. National Hospital of Nauru (RON hospital)
4. College
5. Health Center nearest of RON hospital)
6. Junction box for future connections between RON hospital and Civic Center

After the completion of this J2 project;
At August 2015, DICT deployed following locations to be connected with this G-LAN.

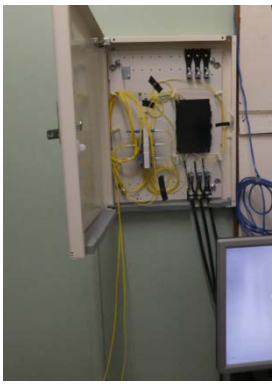
①	Government building	(deployment)
②	Cenpac office at Civic Center	(J2)
③	Revenue office at Civic Center	(J2)
④	High school	(deployment)
⑤	Fire station	(deployment)
⑥	Police station	(deployment)
⑦	University of South Pacific	(future)
⑧	Elementary school	(future)
⑨	Media center	(near future)
⑩	RON National Central Hospital	(J2)
⑪	College	(J2)
⑫	Health Center	(J2)
⑬	Airport building	(planned to lay the cable)
⑭	Power utility	(deployment)
⑮	Port Authority	(planned)
⑯	Phosphate company	(planned)
⑰	Others for future connection	

Cable is already purchased by Nauru government
After power utility replace the electrical pole around the island
Planned Schools, Health Center and government storage house

Others (under consideration):
Rental to other telecom operator
Connection with refugee camps
Super market and other privates

High definition video distributed by Media Center

Below is the site setting the media convertor (connected with 2 fibers for duplex: send and receive). In future, when lack of fiber for additional users, the media convertor will be replaced WDM type as 2 wave lengths communications from 2 single fibers 1 single wave length type.
At the customer site, the installation is just connection with fiber cable to PC through media convertor. No device configuration is required. It is very simple.



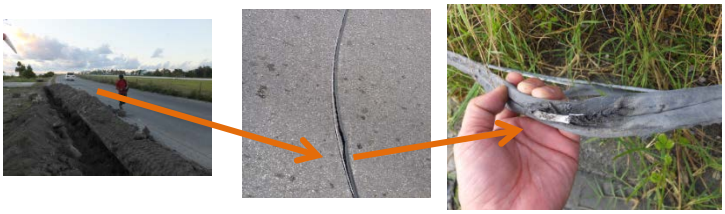
Terminal box and Media convertor at the end user premises.

Connection test at the end user premises.

6. Trouble shooting

During the installation, we had several problem and issues to be resolved such like below;

1. Temporary laying optical fiber cable crossing the main street (especially high temperature near the specification)
2. Special Note/attention in temporary laying the M-PAC cable



Crossing the fiber cable on the main road in hot days, the cable was destroyed.

Measured temperature on road and roof
* about 56 degree

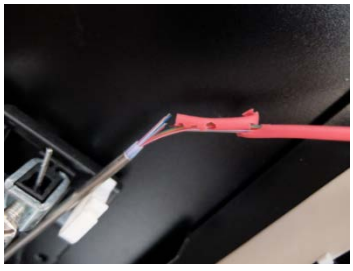
On 1st day we tried to lay the cable crossing the main road but in becoming dark, we could not see any damage of the cable.

Solution: temporary covered by special cover protecting high temperature and topical pressure

Extruded another edge of the fiber cable made pulling the cable difficult.

Solution: putting tube for cable

Mouse likes to bite the fiber because the door of terminal box kept open at temporary ICT center.



7. Operation and deployment

Only staffs of the DICT of Nauru government has responsibility and actual works for plan, installation (deployment), repair, operation, maintenance, administration and coordination with others of this G-LAN.

In the picture, people in rear line are staffs of DICT, and in front line Minister, 3 Japanese and ISP of Nauru.

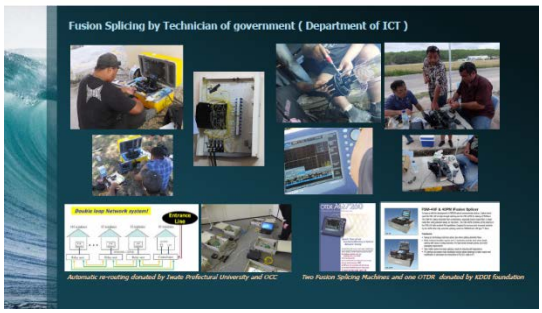
Plan of G-LAN in future in Nauru

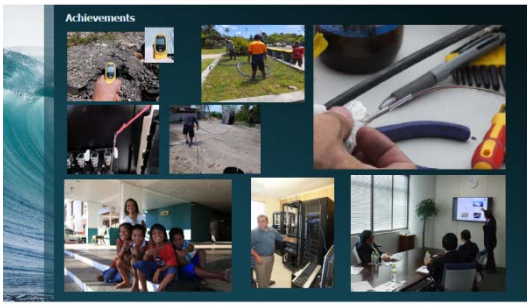
Nauru government decided and procured OCC optical fiber cables (6 drum 30km total) by Nauru budget. We bought the optical fiber cable 6km at APT J2 expense. Now cables were waiting for laying around island of Nauru in near future

Test and lecture of relay units (automatic re-routing ring network) donated by Iwate prefecture university through OCC.

8. ADF report

At the ADF on September, 2015 in Macau, report with additional report regarding operation and deployment of connections, Nauru presented the situation and achievement.





9. Accounting

Interim results on the interim report

Refer to the APT selection letter, below is the budget approved by APT;

APT; Detailed budget to be allocated by APT	
Travel Expense	17,050.00 US$
Daily allowance and accommodation fee	10,060.00 US$
Correspondence expense and shipping fee	4,050.00 US$
Equipment purchase expenses	28,759.21 US$
Miscellaneous	50.00 US$
Total amount	59,969.21 US$

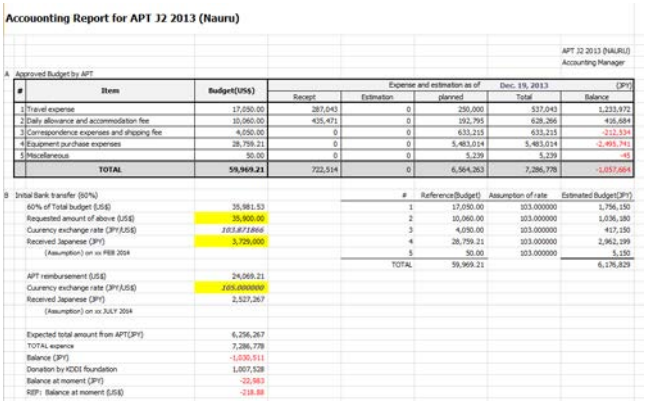
After Tokyo meeting, I as accounting coordinator recalculated and accumulated the amount of expected total cost with assumption refer to new and detailed the procurement, travelling and shipping. Therefore, our budgetary activity will shift little more equipment procurement from travel expense.

Beforehand with starting the kickoff meeting, both Nauru side and Japanese side discussed to reduce the travel budget. Then, one researcher would go to kickoff meeting as same as Nauru researcher would be in Tokyo meeting in order to make more budget to equipment procurement(fiber cable). As we know the maximum APT budget for which we can use, we also look for other alternative budget for getting more benefit and considering best-case scenario.

Also, at current situation, we are under negotiation with several vendors and look for technology to reduce the expense. Therefore, I, as accounting manager at the moment, would like to put the current expected value.

Please kindly refer to the interim accounting data in the annex based on above condition. .

Summary of Interim accounting report is as below.



Accouonting Report for APT J2 2013 (Nauru)

APT J2 2013 (NAURU)
Accounting Manager

A Approved Budget by APT

#	Item	Budget(US$)	Expense and estimation as of Dec. 19, 2013 Receipt	Estimation	planned	Total	(JPY) Balance
1	Travel expense	17,050.00	287,043	0	250,000	537,043	1,233,972
2	Daily allowance and accommodation fee	10,060.00	435,471	0	192,795	628,266	405,684
3	Correspondence expenses and shipping fee	4,050.00	0	0	633,215	633,215	-212,334
4	Equipment purchase expenses	28,759.21	0	0	5,483,014	5,483,014	-2,495,741
5	Miscellaneous	50.00	0	0	5,239	5,239	-45
	TOTAL	59,969.21	722,514	0	6,564,263	7,286,778	-1,057,664

B Initial Bank transfer (60%)

60% of Total budget (US$)	35,981.53
Requested amount of above (US$)	35,900.00
Cuurency exchange rate (JPY/US$)	103.871846
Received Japanese (JPY)	3,729,000
(Assumption) on xx FEB 2014	
APT reimbursement (US$)	24,069.21
Cuurency exchange rate (JPY/US$)	105.000000
Received Japanese (JPY)	2,527,267
(Assumption) on xx JULY 2014	
Expected total amount from APT(JPY)	6,256,267
TOTAL expence	7,286,778
Balance (JPY)	-1,030,511
Donation by KDDI foundation	1,007,528
Balance at moment (JPY)	-22,983
REF: Balance at moment (US$)	-218.88

#	Reference(Budget)	Assumption of rate	Estimated Budget(JPY)
1	17,050.00	103.000000	1,756,150
2	10,060.00	103.000000	1,036,180
3	4,050.00	103.000000	417,150
4	28,759.21	103.000000	2,962,199
5	50.00	103.000000	5,150
TOTAL	59,969.21		6,176,829

*1 Receipt means refer to the official receipt

*2 Estimation means refer to the quotation sheet (almost all of them are already fixed the amount).

*3 Planned means refer to information/expectation of the amount (not decide detail yet, may happen change)

Final accounting result

Following is the results and evaluation of this APT J2 Accounting report in Nauru. See attached the detailed accounting report (A-xx).

0

Approved Budget (J2) is;

	Item Sub-Total (US$)	
1.	Travel Expense	17,050.00
2.	Daily allowance and Accommodation fee	10,060.00
3.	Correspondences and shipping fee	50.00
4.	Shipping	4,000.00
5.	Equipment purchase expense	28,759.21
6.	Miscellaneous	50.00
	Total (US$)	59,969.21

Budget (Expected: JPY)

Since our accounting book is based on Japanese Yen (JPY), below table is rough total budget for this APT J2 project, translated from above approved budget, refer to up-to-date currency exchange rate.

	Item Sub-Total (JPY)	
1.	Travel Expense	1,960,750
2.	Daily allowance and Accommodation fee	1,156,900
3.	Correspondences and shipping fee	5,750
4.	Shipping	460,000
5.	Equipment purchase expense	3,307,309
6.	Miscellaneous	5,750
	Total (JPY)	6,896,459

Expense after completion (JPY)

Below table is including donation by KDDI foundation.

	Item Sub-Total (JPY)	
1.	Travel Expense	2,161,878
2.	Daily allowance and Accommodation fee	668,746
3.	Correspondences and shipping fee	0
4.	Shipping	685,854
5.	Equipment purchase expense	4,320,338
6.	Miscellaneous	0
	Total (JPY)	7,836,816

Results and evaluation of requesting total reimbursement to APT including initial payment;

As the results, we have following 4 amount value for accounting evaluation. Detail and how to get the value are shown in attached final accounting report (and above the tables).

A.	Rough amount of approved budget (JPY)	6,896,459
B.	Amount of expense (JPY)	7,842,226
C.	Portion of Donation by KDDI foundation (JPY)	1,238,156
D.	Initial payment (60%) (JPY)	3,632,362
E.	Requesting amount at final(JPY)	2,971,708

(1)	Expected Approved budget	= A	= 6,896,459	= 6,896,459
(2)	Whole expense	= B	= 7,842,226	= 7,842,226
(3)	Portion of budget by APT	= B – C	= 7,842,226 - 1,238,156	= 6,604,070
(4)	Request amount (rest)	= B–D-C	= 7,842,226 – 3,632,362 – 1,238,156	= 2,971,708
(5)	Balance of project:	= A+C-B	= 6,896,459 + 1,238,156 - 7,842,226	= 292,389
(6)	Comparison	= (5)	= 292,389	> 0

We successfully achieved this APT J2 project, and not only sustain this system but also extend/deployment of this system, especially Internet and LAN (in the Island). Also, the situation in Nauru regarding ICT was dramatically improved during execution of this project.
Therefore, we would express our deepest appreciation on APT selection even we should change J2 from J3 proposal.

Regarding the accounting matters, we had following critical issues;

1. Between Nauru and Japan, it takes rather high expense and long hours for travel. Also, accommodation is so limited (only 2 hotels in this country) with Australian cost of living.
2. In addition, the Republic of Nauru decided to accept the Australian request about refugee treatment. This coursed so many Australian people from government and NPO/NGO for support come in small nation. Then we always took very hard to get the hotel room even by their local partnership.
3. Since this issue was priority in the Nauru, the government of Nauru decided to establish the resource center (renovation of the ruins of former Telecom building) and also procured the optical fiber cables for extension of government LAN in the island (Nationwide). More than 5 times of the procurement of this APT J2 project.
4. According to limited budget, KDDI foundation decided donated 2 fusion splicers and 1 OTDR,

preowned, for construction of optical fiber network by themselves (staffs in DICT, government of Nauru). Including improving their skill of splicing as well as fiber construction.

5. Regarding practical development of human skill of splicing and construction of optical fiber network, we had to request OCC Corporation to support the initial stage of construction as online job training. After discussions, OCC kindly supported this HRD with their budget, partially and whole. Also, they negotiate Iwate Prefecture University to donate the auto routing relay units.
6. One of most difficulty was the trouble of temporary laying optical fiber cables crossing the road/path by distinguish high temperature on the road of Nauru during daytime.

In the result, the balance of this project in the view of the APT approved budget;

(1) Total expense is within the APT approved budget.
(2) Equipment purchase was rather increasing but we could reduce the expense of daily allowance, negotiating price in discount, and donation/support with our idea.
(3) The Cost of Approximately 4km for aerial construction and approximately 2km for underground construction in our project was extremely low cost compared with normal construction in advanced countries. Even the stuffs/parts were qualified by Japanese standard.
(4) Total about 6km long of optical fiber cable network for Government Local Area Network from new ICT Resource Center.

10. Conclusion

As the result of completion of this APT J2 project in Republic of Nauru regarding improving national ICT performance and quality of local people life, Resource center and broadband optical fiber network were extremely contributed. Before the APT project, technical staffs in DICT should select one good cupper line of the old cable shown in the picture. It was un-reliable and so slow less 10kbps, anyway. Also high internet usage charge not broadband. Due to bankruptcy of Telecom, no fixed line was in service.

Now, except Internet connection with outside, they have reliable 1Gbps network in Government-LAN. In addition to this project, even Internet access charge was dramatically improving because everyone know the performance of optical fiber network performance in Nauru. It becomes competitive situation in Internet.

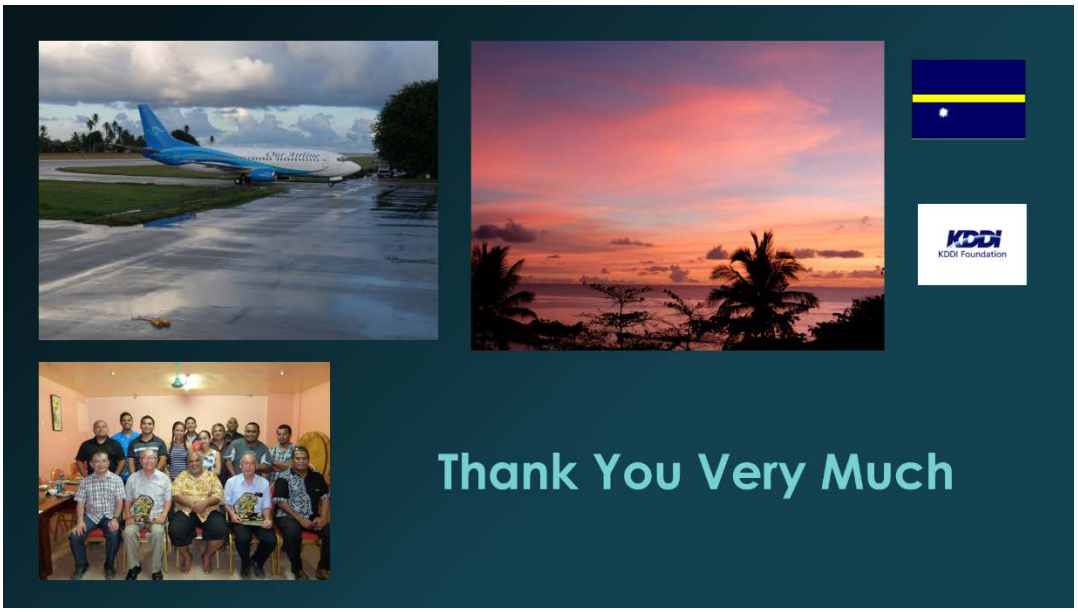
Also, the resource center has training room and technical support room to increase the literacy and capability of ICT of local Nauru people.

Thus, this type of optical fiber cable would be tremendously contributed to be installed easy and costless in area away from broadband with realty, reflecting to local people's motivation of ICT

Now they are user of Resource center and G-LAN

11. Acknowledgement

The APT J2 HRD project team "Study of Resource Center as new concept in Republic of Nauru, where is very limited Internet connection" executed in Republic of Nauru would like to express our sincere appreciation for selecting and supporting this proposal by Asia-Pacific Telecommunity. We achieved this project very successfully and is about to deploy the next level. Also, the team would like to thank the Government of Japan for the extra-budgetary contribution. Also we thank OCC Corporation for kind and enthusiastic support and assistance without labor fee. The Nauru team would like to thank KDDI foundation to donated 2 fusion splicing machine and OTDR instrument.


KDDI
KDDI Foundation
Thank You Very Much


Our Airline

12. Annex:

A-1. Acronyms

APT	Asia Pacific Telecommunity
AS	Autonomous System
ATM	automated teller machine
CCE	Community and Continuing Education
CIA	Central Intelligence Agency
DFL	Distance and Flexible Learning
DICT	Department of Information, Communication and Technology
DNS	Domain Name Server
Footpath	Education Strategic Plan for Nauru
FTTH	Fiber To The Home
G-LAN	Government - Local Area Network
GSM	Global System for Mobile Communications
ICT	Information, Communication and Technology
ITU	International Telecommunication Union
J2	APT J2 (human development project)
J3	APT J3 (pilot installation project)
LAN	Local Area Network
MP	Member of Parliament
M-PAC	Metal Packed armored Cable
NSDS	National Sustainable Development Strategy
PC	Personal Computer
TV	Television
TVET	Technical Vocational Education and Training
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus
USP	University of the South Pacific
VSAT	Very Small Aperture Terminal
WiFi	wireless fidelity
WiMAX	Worldwide Interoperability for Microwave Access

A-2. Kick off meeting material and output

APT J2 Project in Nauru "Study of Resource Center and G-LAN"
Kickoff meeting

16 - 25 September, 2013
DICT/Nauru
KDDI foundation

Agenda

1. Date and venue
① September. 16 through 25, 2013
② Republic of Nauru, DICT and related organization
③ Meeting with DICT
① Minister of Communications HE Mr. Shaldog Bernicke
① Secretariat Mr. Chris Stephen
② Director Mr. Geoffrey Harris
③ Project Manager Mr. John Fong
④ Network Administrator Mr. Isirei Guivalu
⑤

2. Agreement of Agenda
Member change
DICT
Media
Education
Others

3. Review the J2 proposal
① J2 proposal, organization and each role
② Project members, participants and co-operators
③ Tele Center(Resource Center)
④ ASTAP and ADF
⑤ OCC material
⑥ Others
⑦

4. Agreement of collaboration and cooperation with DICT and KDDI foundation

5. Key activities
① Kick off and site survey
② Study and design
③ Procurement and shipping
④ Tokyo meeting and research
⑤ Installation and evaluation
⑥ (improvement : TBD)
⑦ Report (Interim and final / Activity and Accounting) to APT
⑧ ADF meeting in next year

6. Policy, national strategy and deployment plan
Sample: ICT strategy of FSM
Japan (MIC) in Tokyo meeting

7. System design
① Procurement (Fiber and others)
② Access point in Nauru
① Ministry of Communications/Transpiration/ DICT & regulatory
② Media
③ Education/school

④ Finance/Revenue
⑤ Government building / school /others
③ Shipping (Japan=>Guam=>Fuji=>Nauru)
④ Paper work(Export/Parameter list,　Import/TAX exception/
8. Product and stuffs
① Optical Fiber
② Splicing tool and OTDR(Measurement tool)
③
9. Installation
① Route of fiber
② Digging the route (or holding)
③ WiFI/WiMAX route (1 link)
④ ONU
⑤ Splicing and OTDR
⑥ PC and Printer
⑦ Servers(web, proxy, file, streaming and LAN)
⑧ WiFi router/HUB and cables
⑨
10. Tokyo meeting
① Schedule
DEC 02 –Dec. 06 (Nov 29 – Dec. 09), 2014
② Discussion
Study and research of optical fiber cable
Procurement
　Installation
　Shipping

③ Study and research
① OCC, MIC JAPAN, KCS(?),
② Research trip to cable factory
③ Study visit to fiber cable splicing
④ Others (TBD)
⑤ Others

11. Operation and Maintenance

12. Next step and deployment
① Government LAN rounding island
② LAN in side island

13. Presentation in ADF by Nauru
Next ADF meeting in AUG.(?)　2014

14. Training (for splicing and OTDR)　* TBD

15. Other business

16. Transmitter

Schedule APT J2 Project in Nauru in 2013 (Kickoff meeting)

KDDI Foundation
YOSUKE UCHIYAMA
19 July, 2013

#	Date	Day	Place	HOTEL	Activities	Remarks
REF:	Sep. 08	SUN	Bangkok	CFM(CENTRA GRAND)	FLIGHT: JAPAN=> BANGKOK(Thailand)	
REF:	~		Bangkok	CFM(CENTRA GRAND)	C&I / ASTAP	
REF:	Sep. 14	SAT	Bangkok Flight	Checkout Afternoon Flight	AM/PM: ASTAP Night: Flight Bangkok(23:50) =>Brisbane	
REF:	Sep. 15	SUN	Flight	Flight	Arrival at Brisbane on morning	DEPARTURE: BNE(11:00PM 15 SEP. 2013) CHN003
1	**Sep. 16**	**MON**	Nauru	*** **Menen Hotel** **Check-in early Morning**	PM: Meeting w/DICT (schedule/agenda for this kickoff)	ARRIVAL: CHU (05:35AM 16 SEP. 2013) AM: Check-in and PM: Meeting w/DICT
2	Sep. 17	TUE	Nauru	*** Menen Hotel	Kick-off meeting and courtesy visit	
3	Sep. 18	WED	Nauru	*** Menen Hotel	same above	
4	Sep. 19	THU	Nauru	*** Menen Hotel	Site visit /Discussion	
5	Sep. 20	FRI	Nauru	*** Menen Hotel	Site visit /Discussion	
6	Sep. 21	SAT	Nauru	*** Menen Hotel	Site visit /Discussion	
7	Sep. 22	SUN	Nauru	*** Menen Hotel	HOLIDAY	
8	Sep. 23	MON	Nauru	*** Menen Hotel	Discussion with relevant persons/site	
9	Sep. 24	TUE	Nauru	*** Menen Hotel	discussion	
10	**Sep. 25**	**WED**	Nauru Flight Brisbane	*** **Menen Hotel** **Check-out at Noon** Flight HOTEL(TBD) in Brisbane	Final discussion(Conclusion of General and Kickoff) FLIGHT	AM: Final Discussion w/DICT DEPARTURE: CHU (02:15PM 25 SEP. 2013) CHN001 Arrival: BNE (04:30PM 25 SEP. 2013) Stay in Brisbane
REF:	Sep. 26	THU	Flight	Flight	FLIGHT	FLIGHT : Brisbane=> Bangkok, Bangkok=>Narita JAPAN
REF:	Sep. 27	FRI			FLIGHT	Arrival: JAPAN

Discussion items	
	Greetings
	Activities and condition/responsibility
	Agreement/Minute of our relashinship&activities
	Rough project schedule
	Space, facility, procurement(equipment and etc.)
	Nauru ICT National Strategy and Plan
	Resource Center
	Government LAN
	Optical fiber and access network design
	Installation/Construction of fiber and resource center
	Shipping from Japan to Nauru
	How, by whom and how lower cost to install the fiber cables
	Procurement of equipment in Market (shop?)
	Maintenance & operation/Human resource
	Discussion with Media, Education and Finance(?) for usage/application
	Detail regarding Tokyo meeting(schedule & activities)
	Future deployment(if need at this time)
	Kickoff meeting conclusion
Site	
	Resource center
	Buildings of government to be install the fiber (DICT/Resource center/Media/Finance/Education/etc.9
	Inter-connection room at Civic Center
	Other access point and access lines(Airport building/port authority/etc.)
	Shop/Constructor/Shipping/etc.
Courtesy visit	
	please advice and arrange the appointments

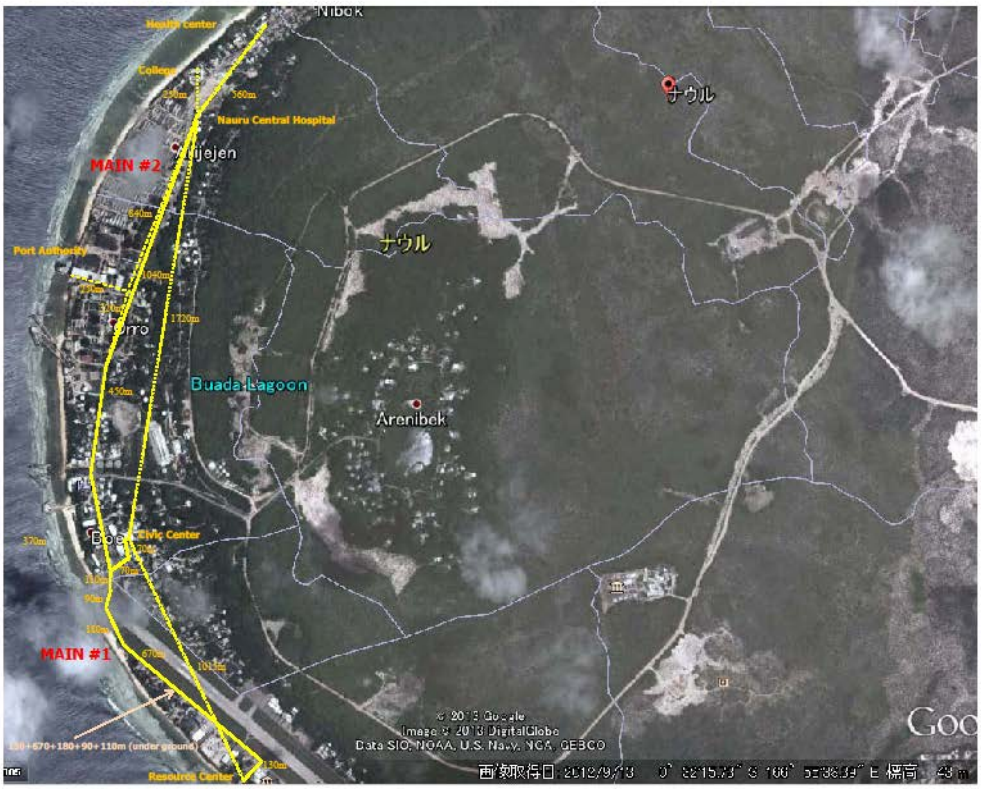
1. Discussion
    (1) Agreement, Work Flow and roll
    (2) Rough Schedule with activities
    (3) Reference of Optical fiber cable
    (4) Optical fiber cable routes and its installation
    (5) Relevant to Construction(for Road and Aerial)
    (6) Budget amount and required support of each side
    (7) Shipping stuffs such as fiber from Japan to Nauru
    (8) Courtesy Visit

2. Site Survey
    (1) New route based on current situation
    (2) Detailed method to hook up the cable and connection
    Adequate and Appropriate fiber routes

(3) Room. Building and location for termination and connection

(4) Each electrical pole for hooking up, and future plan

Tentative Cable Route Map in Nauru, APT J2 (Included Planed)



MAIN #1 130+670+180+90+110+70+70= 1320m > 1015m
MAIN #2 70+70+370+450+1040= 2000m > 1720m

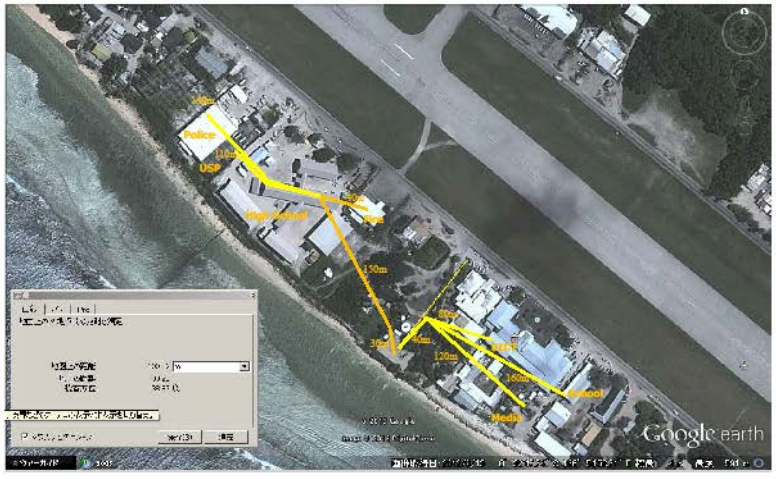


Figure 6 New route of G-LAN

A-3. **Tokyo meeting material and output/information**

1. Discussion
2. Rural Area communication with technology
3. Optical fiber submarine cable
4. Optical fiber terrain cable
5. Technical visit in cable factory
6. Courtesy visit and research strategy at MIC Japan
7. Decision making

Tentative Schedule for APT J2 Tokyo meeting (as of DEC. 04, 2013)

KDDI foundation

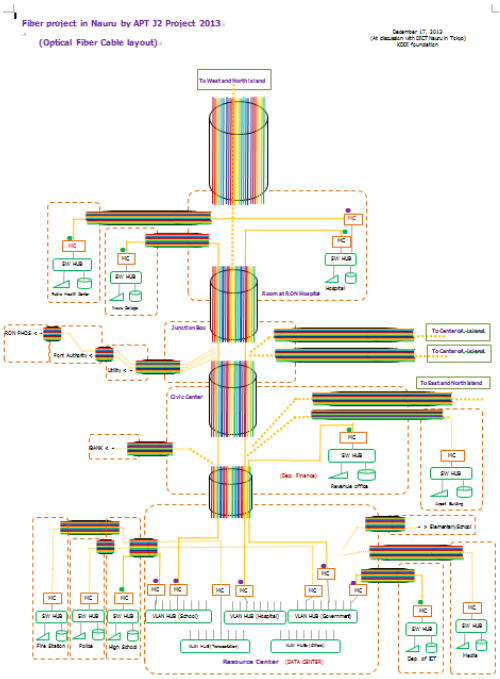
#	Date (DEC.)	day	Place	Activity	Remarks
0	5	THU	Flight	AM/PM forum : Flight midnight	12/1 ON003 =>Brisbane 12/2 QF 051 =>Singapore 12/2 QF4238=> Kuala Lumpur Kuala Lumpur(APT Forum) 12/5 23:35 MH 088 =>Narita(Japan)
1	6	FRI	Limousine Bus Hotel(Shinjuku)	AM: arrival Noon: Arrival at the hotel PM: Discussion the hotel at Shinjuku (Iidabashi?)	⇨ Narita T2 at 07:15 by, MH088 Limousine Bus (Narita T2=> Shinjuku Washington Hotel) Below: 08:00=>10:05 08:40=>10:45 09:20=>11:25 10:00=>12:05 Hotel Check-in after 12:00
2	7	SAT	Holiday		TBD
3	8	SUN	**	Holiday	TBD
4	9	MON	Iidabashi (GAT 6F)	APT Training(Temporary Participation)	Rural communication by Uchiyama
5	10	TUE	Iidabashi (GAT 6F)	APT Training(Support the class room) .* Discussion in free time	Class room by Osawa *Free or TBD
6	11	WED	Kawasaki Yokohama	AM: KCS/Kawasaki (10:00-12:00-13:00) & Train : 30min PM: OCC/Yokohama(14:00-17:00-20:00)	Shinjuku 08:30 =>Kawasaki Sub-Marine cable installation Optical fiber for this project Yokohama =>Shinjuku 21:30
7	12	THU	Tochigi	AM/PM: OCC factory Bullet Train(go) / Ordinary Train (back)	Leave at hotel 09:20 Express YM-33 10:08-10:58 & 11:15 (Utsunomiya) 11:26 (to Ishibashi) Ordinary Train (back to Shinjuku) 16:38-18:18, 17:08-18:52, 18:16-19:57,
8	13	FRI	GAT28F (G)	AM&PM Discussion	Planned activities Procurement
9	14	SAT	**	(Spare: Discussion)	TBD
10	15	SUN	**	Holiday	TBD
11	16	MON	GAT28F (G)	AM&PM Discussion	Design and shipping, Installation
12	17	TUE	Kasumigaseki GAT28F (I)	AM: MIC Japan 9F PM: final conclusion13:30-17:00	Courtesy visit at Japanese Gov. With OCC
13	18	WED	Flight	Departure	Hotel Check-out till 12:00 Bus: front of the hotel => Narita T2 (12:00-14:05, 13:00-15:00, 13:55-15:55, 15:00-17:00) QF 022 (to Sydney) 19:50-07:25(+1)
14	19	THU	Flight	Transit	QF 512 (to Brisbane) 09:05-09:35
--	20	FRI	Flight	Arrival	On 002 (to Nauru) 23:00-05:35

Cable connection and installation of G-LAN

Most of discussion in Tokyo is the cable route conjunction with reduction of cost and other budget expense, refer to current situation and requirement of Nauru, based on APT J2 proposal.

Finally, we agreed rough timeline, fiber cable route & installation, access points and so on.

Right figure is rough connection diagram.



Ministry of Internal affairs and Communications, Japan

Courtesy visit at MIC JAPAN (ministry of Interior and communication)

ICT Strategy and Statistics in Japan

KDDI Cable Ship company KCS)

Courtesy Visit at Communications

Presentation of Policy and Strategy in Japan

OCC Corporation (OCC)

General technology for optical cable

Submarine Fiber cable and terrestrial fiber cable

M-Pac fiber cable as we are planning to install in the island

Network design for this APT project and its technology

Method and tools for the optical fiber installation

Splicing and measurement

Pricing negotiation

Future plan and cost

Fiber cable factory of OCC

How to make the Coaxial and optical fiber cable

Watching the fabrications of the optical fiber cable at each site

Discussion with Members (Nauru DICT and KDDI foundation)

General schedule

Shipping period and charge and route points

Network utilization

Application which we will invite

Installation and participation from Japan (if budget is constraint)

Tools and tools for installation

Instrument and tool for construction of optical

Evaluation

Future Plan

Check the process about future plan including cost

Report 'Interim and Final/ JMJK

Refer to the APT selection letter, below is the budget approved by APT;
;

APT; Detailed budget to be allocated by APT

Travel Expense	17,050.00 US$
Daily allowance and accommodation fee	10,060.00 US$
Correspondence expense and shipping fee	4,050.00 US$
Equipment purchase expenses	28,759.21 US$
Miscellaneous	50.00 US$

Total amount
59,969.21 US$

As I am accounting Coordinator of this J2 project, I request the bank transfer of 60 % amount of the maximum budget for this Apt J2 project to KDDI foundation account, refer to the requesting letter around same time.

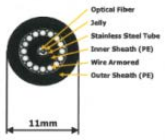
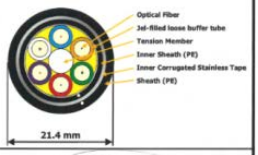
According our discussion before kickoff and after selection, we agreed to make effort to reduce the travel expense and add the amount of cable procurement due to supporting the Nauru Central Hospital which was recently burned by accident.

We understood the budget is not enough to complete in whole resource center and fiber network. Therefore, Nauru government will try to get another budget to step up on higher landing point such as renovation of Telecom building for Resource Center. KDDI foundation is also considering to donate some stuffs to maintain the new technology in Nauru.

A-4. **Optical Fiber cable and network design information**

Comparison OPTICAL CABLE CORPORATION

Yellow hatched parameters show M-PAC Cable superiorities

Cable Type		Wire Armored M-PAC	B-Series Corrugated Steel tape Armored Cable
Installation Environment		Direct buried, Under Water	Direct buried
Fiber Count (Single Mode)	4-Fiber Ribbon	4 ~ 24	N.A.
	Loose Fiber	1 ~ 48	24 (2 ~ 36)
Typical Outside Diameter		11.0 mm	21.4 mm
Approximate Unit Weight		180 kg/km, 200 kg/km(Frame Retardant)	391 kg/km
Allowable Tensile Strength		3,500 N	1,800 N
Allowable Lateral Pressure		5,000 N/100mm	4,400 N/100mm
Allowable Bending Radius	Fixed	110 mm	214 mm
	Extended	220 mm	321 mm
Cross Section Diagram			
One Continuous Length		As Ordered	1,000 m ?
Maximum One Length		12,000 m	2,000 m ?

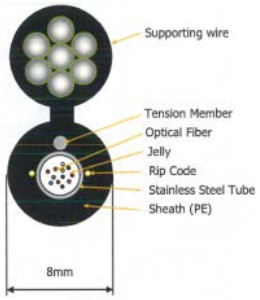
M-PAC for Nauru APT J2 Project

All-rounder

Aerial ***Direct buried*** ***Indoor***

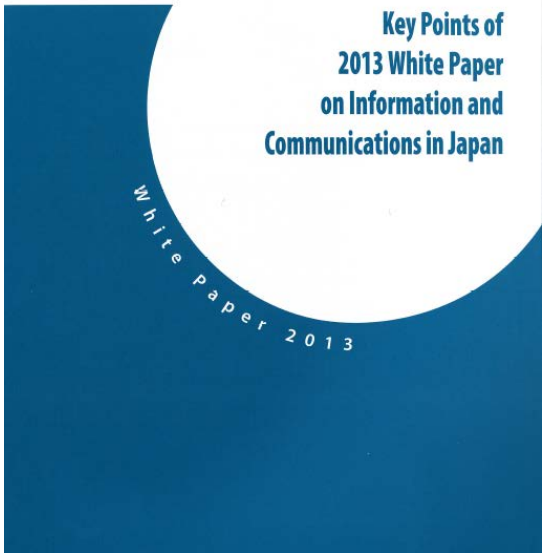
Cable Type		Self supported M-PAC with Tension Member
Installation Environment		Aerial, Direct buried, Indoor
Fiber Count (SMF)	4 Ribbon Fiber	4 ~ 12
	Loose Fiber	1 ~ 24
Typical Outside Diameter		8mm*18mm
Approximate Unit Weight		300kg/km(*1)
Allowable Tensile Strength	Cable + Supporting wire	7,500 N
	Cable	890 N
Allowable Lateral Pressure		1,960N/100mm
Allowable Bending Radius	Fixed	80mm
	Extended	160mm
One Continuous Length		As Ordered
Maximum One Length		12,000m

(*1) : Frame Retardant



Cross Section Diagram

A-5. **Courtesy visit and study the ICT strategy in Japan**



Chapter 1

Utilizing "Smart ICT" Advancement to Create New Values

Section 1 New ICT Trend: "Smart ICT" to Produce Japan's Vigor and Growth

1. "Smart ICT" to produce Japan's vigor and growth — General —

(1) ICT and economic growth — A basic framework —

a. Factor decomposition from the macroeconomic viewpoint

From the macroeconomic viewpoint, economic growth is decomposed into labor input, capital input and total factor productivity. Labor input represents the quantitative expansion and qualitative improvement of labor. TFP indicates productivity improvements that cannot be explained by labor or capital input growth.

b. ICT as growth engine — ICT-using industries' growth combined with ICT industry's growth

First, ICT has served as a growth engine. In ICT-using industries or sectors, TFP growth through labor productivity growth induced by information capital investment and through production method improvements has been combined with the integration of various products and services with Big Data and smartphone use to boost value added to products and services. On the other hand, growing demand for ICT services and equipment in the ICT-using sectors has encouraged the ICT industry's technological innovation and development and produced the ICT industry's growth, leading to a virtuous circle. The entire ICT industry, including the software, services and hardware sectors, has served as a growth engine to drive Japan's economy.

c. ICT as versatile tool — Using ICT for solving global social challenges and expanding such solutions globally

Another role of ICT in economic growth, which has attracted attention over recent years, is to serve as a versatile tool. Social challenges that have become constraints on growth in Japan are or will become common to other countries. Japan may use ICT-based innovations for solving these challenges and expand the solutions and relevant know how globally. Such global expansion is expected to come through efforts to use ICT for various social challenges facing Japan.

(2) Using new ICT trend to drive growth — Smart ICT —

Cloud, Big Data, mobile, social and other new ICT technology and service innovations are producing a new ICT growth base. The new ICT trend is expected to greatly improve growth potential in various areas not only for the ICT industry but also for ICT-using industries or sectors.

As Big Data technologies have been used more widely, for example, systems that had been used mainly for production lines at large companies and sales management at large distributors are now available for easy use for street shop management and public areas including education and healthcare.

The use of social media for various analyses has expanded from advertisement to a wide variety of other areas. It has been pointed out that as goods have growingly been commoditized, every industry or sector has grown more service-oriented, with how to maximize values for continuous use rather than exchange being important for competition. ICT has traditionally accelerated this trend toward a stage where ICT users are co-creating values.

As for solving social challenges, meanwhile, Big Data and M2M (machine to machine) sensor networks can be used for efficiently controlling various social infrastructures. They can also be expected to contribute to solving resources problems facing Japan. Furthermore, open data may be used for creating various user-friendly public services at the initiative of the private sector.

In this way, the new ICT trend or "smart ICT" has gone beyond traditional ICT systems used mainly for improving operations and productivity and has the potential to produce a new growth engine.

(3) Using smart ICT for accelerating Japan's vigor and growth

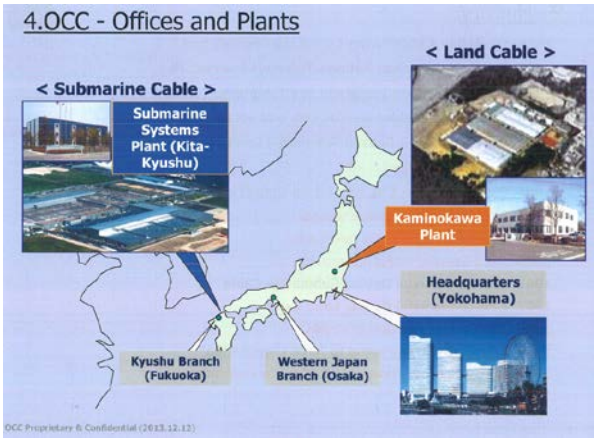
How have Smart ICT components including mobile (smartphone and M2M), cloud computing, Big Data and social media technologies diffused in Japan? Figures 1-1-1-1 and 1-1-1-2 show the results of an Internet survey on the diffusion of smartphones and social media in Japan, the United States, the United Kingdom, France, South Korea and Singapore. They indicate that Japan has not necessarily achieved the world's top position in diffusing smartphones or social media.

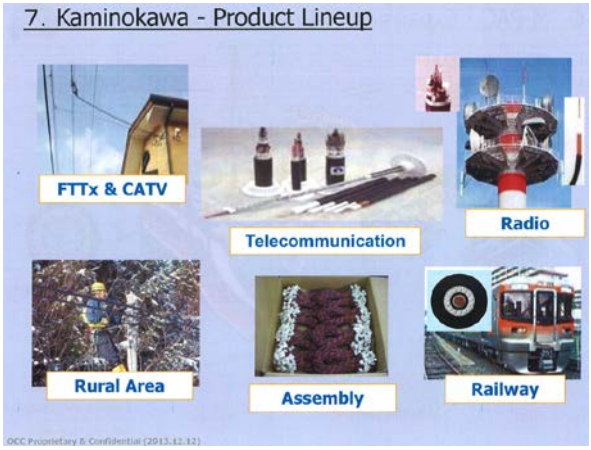
The survey's results regarding various Internet services show that users of e-commerce online purchases of and trade in goods and services in Japan accounted for 78.3% of respondents in the survey. Although the percentage share is the highest among the six countries, the share for users of electronic central and local government services (electronic applications, declarations and reports) in Japan is limited to 16.2%, far lower than in the other countries.

A comparison of cloud network technology use rates among Japanese and U.S. enterprises (in March 2013) shows that the rate in the United States reached 70.4% against 42.4% in Japan (Figure 1-1-1-3). There is a wide

A-6. **Technical visit and discussion at Cable plant (OCC) and Submarine cable at KCS**

OCC Kaminokura Plant





Submarine cable installation and status at KCS

2. TECNOLOGY and CONFIGULATION

2.1 General

In general a fiber optic submarine cable system consists of submarine cable, repeaters and terminal equipment. Submarine cable and repeaters are laid on the sea bottom. A suspension of cable would cause a cable failure. In order to protect the submarine cable, the cable laid shallower than 700 ~ 1,000 m sea depth is buried under the sea bottom where possible in the area of heavy fishing. The cable from shallow water to the cable landing station is also buried where possible or is protected by pipes or ducts. Submarine cable and repeaters are designed and tested to work at the sea depth of 8,000 m for 25 years.

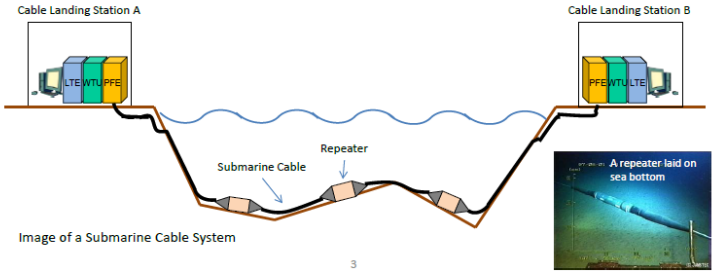


Image of a Submarine Cable System

3

A-7. **Fusion Splicing Machine for DICT, Nauru, donated by KDDI foundation**

We are considering to procure the below secondhand fusion splicing machine for our construction of the 1st fiber network installation in Nauru.

AFL Telecommunications
A Fujikura Business

Fusion Splicing Systems

FSM-40F

FSM-40PM

FSM-40F & 40PM Fusion Splicer

To keep up with the development of DWDM optical communication devices, Fujikura developed the FSM-40F for high strength splicing and the FSM-40PM for splicing of PM fibers. The FSM-40F splices dissimilar fiber combinations, especially Erbium-doped fiber to single-mode fiber using patented sweep arc functions. The FSM-40PM combines all the features of the FSM-40F with excellent PM capabilities. Designed for accuracy and increased productivity, the 40PM offers fully automatic splicing modes for PANDA® and 3M Tiger™ fibers.

Features

- Sweep arc technology minimizes splice loss when splicing dissimilar fibers
- Multi-functional movable V-groove and Z-mechanism provides short cleave length splicing with various coating diameters for high tensile strength splicing and small packaging requirements
- Fiber holder system increases splicing results by reducing skill dependancy
- PC Interface and power meter feedback function allows download of splice results and modification of parameters by connection of RS232C cable to PC

Specifications

PARAMETER	VALUE
Applicable Fibers	SM, MM, DS (dispersion shifted), NZ-DSF (non-zero dispersion shifted), CS (cut-off shifted), ED (erbium-doped) fibers PM (polarization maintaining) PANDA, 3M Tiger™, Bowtie (FSM-40PM only)
Fiber Cleaved Length	8 to 10mm with bare fiber clamping; 3 to 5mm with coating clamping (*Ny Jacketed (SI buffer) or loose tube fiber cannot be used)
Actual Splice Loss	Typical 0.02dB (bare fiber clamping) / 0.03dB (coating clamping) with identical SM fibers (ITU-T G.652) Typical 0.04dB (bare fiber clamping) / 0.05dB (coating clamping) with identical DS fibers (ITU-T G.653) Typical 0.01dB (bare fiber clamping) / 0.01dB (coating clamping) with identical MM fibers (ITU-T G.651) Typical 0.06dB (bare fiber clamping) / 0.07dB (coating clamping) with identical PANDA fibers and identical 3M Tiger™ fibers (FSM-40PM only)
Splicing Time	Typical 25 seconds with SM/MM fibers; Typical 40 seconds with DS/NZ-DS fibers Typical 50 seconds (bare fiber clamping) with PANDA fibers (FSM-40PM only) Typical 100 seconds (bare fiber clamping) with 3M Tiger™ fibers (FSM-40PM only)
Return Loss	>60dB
Cross Talk with Pm Fibers	Typical -40dB (0.6 degree) with PANDA; Typical -32dB (1.4 degree) with 3M Tiger™ (FSM-40PM only)
High Tensile Strength Splicing Performance	Typical 2.5 Gpa (30N) with coating clamping
In-line Proof Tester	Approximately 2N
Viewing Method	5" TFT color LCD monitor with 350X, 270X, 175X, or 135X magnification, external RCA jack for NTSC video signal
Splice Loss Storage	Last 1200 splices
Altitude Requirement	0 to 3500m above sea level
Operating and Storage Temperature	0 to 40°C, 0 to 95% relative humidity (operating); -40 to 80°C, non-dew (storage)
Power Supply	AC100 to 240V (50/60 Hz) with ADC-10 adapter
Dimensions (W x D x H)	FSM-40PM (311mm x 218mm x 133mm), FSM-40F (311mm x 218mm x 127mm)
Weight	FSM-40PM (6.1kg); FSM-40F (5.5kg)

www.AFLtele.com or 1.800.235.3423

14

A-8. **Accounting (Interim on December 18, 2013)**

Following was interim accounting status for your reference:

Accouonting Report for APT J2 2013 (Nauru)

APT J2 2013 (NAURU)
Accounting Manager

A Approved Budget by APT

#	Item	Budget(US$)	Expense and estimation as of Dec. 19, 2013				(JPY)
			Recept	Estimation	planned	Total	Balance
1	Travel expense	17,050.00	287,043	0	250,000	537,043	1,233,972
2	Daily allowance and accommodation fee	10,060.00	435,471	0	192,795	628,266	416,684
3	Correspondence expenses and shipping fee	4,050.00	0	0	633,215	633,215	-212,534
4	Equipment purchase expenses	28,759.21	0	0	5,483,014	5,483,014	-2,495,741
5	Miscellaneous	50.00	0	0	5,239	5,239	-45
	TOTAL	**59,969.21**	722,514	0	6,564,263	7,286,778	-1,057,664

B Initial Bank transfer (60%)

		#	Reference(Budget)	Assumption of rate	Estimated Budget(JPY)
60% of Total budget (US$)	35,981.53	1	17,050.00	103.000000	1,756,150
Requested amount of above (US$)	35,900.00	2	10,060.00	103.000000	1,036,180
Cuurency exchange rate (JPY/US$)	*103.871866*	3	4,050.00	103.000000	417,150
Received Japanese (JPY)	3,729,000	4	28,759.21	103.000000	2,962,199
(Assumption) on xx FEB 2014		5	50.00	103.000000	5,150
		TOTAL	59,969.21		6,176,829
APT reimbursement (US$)	24,069.21				
Cuurency exchange rate (JPY/US$)	*103.000000*				
Received Japanese (JPY)	2,527,267				
(Assumption) on xx JULY 2014					
Expected total amount from APT(JPY)	6,256,267				
TOTAL expence	7,286,778				
Balance (JPY)	-1,030,511				
Donation by KDDI foundation	1,007,528				
Balance at moment (JPY)	-22,983				
REF: Balance at moment (US$)	-218.88				

C Expence, Cost and Estimation

1 Kickoff and Site Survey

#	Item	Budget(US$)	Expense and estimation as of Dec. 19, 2013				(JPY)
			Recept	Estimation	planned	Total	Balance
1	Travel expense	6,800.00	262,593	0	0	262,593	443,736
2	Daily allowance and accommodation fee	3,680.00	200,518	0	0	200,518	181,731
3	Correspondence expenses and shipping fee		0	0	0	0	0
4	Equipment purchase expenses		0	0	0	0	0
5	Miscellaneous		0	0	0	0	0
	TOTAL	**10,480.00**	463,111	0	0	463,111	625,466

2 Tokyo meeting

#	Item	Budget(US$)	Expense and estimation as of Dec. 19, 2013				(JPY)
			Recept	Estimation	planned	Total	Balance
1	Travel expense	3,450.00	24,450	0	0	24,450	133,908
2	Daily allowance and accommodation fee	2,700.00	234,954	0	0	234,954	48,500
3	Correspondence expenses and shipping fee		0	0	0	0	0
4	Equipment purchase expenses		0	0	0	0	0
5	Miscellaneous		0	0	0	0	0
	TOTAL	**6,150.00**	259,404	0	0	259,404	179,408

* Need to know how much pay for flight ticket?

3 Installation and Practical evaluation

#	Item	Budget(US$)	Expense and estimation as of Dec. 19, 2013				(JPY)
			Recept	Estimation	planned	Total	Balance
1	Travel expense	6,800.00	0	0	250,000	250,000	456,329
2	Daily allowance and accommodation fee	3,660.00	0	0	192,795	192,795	189,453
3	Correspondence expenses and shipping fee	4,050.00	0	0	633,215	633,215	-212,534
4	Equipment purchase expenses	28,759.21	0	0	5,483,014	5,483,014	-2,495,741
5	Miscellaneous	50.00	0	0	5,239	5,239	-45
	TOTAL	**43,339.21**	0	0	6,564,263	6,564,263	-2,061,539

A-9. **Accounting (Final on August31, 2015)**

See attached Final Accounting Report.

Below is the summarized page in the final accounting report. Our expense is little over due to the currency exchange rate at the time of requesting.

Accounting Report (Summary)

Nov 25, 2015
KDDI Foundation

1 Approved Budget(J2)

Item	Sub-Total(US$)
1 Travel Expense	17,050.00
2 Daily allowance and Accommodation fee	10,060.00
3 Correspondences and shipping fee	50.00
4 Shipping	4,000.00
5 Equipment purchase expense	28,759.21
6 Miscellaneous	50.00
Total(US$)	**59,969.21**

2 Requested Pre-payment

Item	Amount		
60% (US$)	35,981.53		
Requested amount(US$)	35,900.00		
Transferred amount(JPY)	**3,632,362**	Rate at Transfer	101.18000

3 Accounting matrix

Budget (US$)	Kickoff (Nauru)	Research (Tokyo)	Installation (Nauru)	Improvement* (Nauru)	Sub-Total (US$)	(%)
1 Travel Expense	6,800.00	3,450.00	6,800.00		17,050.00	28%
2 Daily allowance and Accommodation fee	3,680.00	2,700.00	3,680.00		10,060.00	17%
3 Correspondences and shipping fee			50.00		50.00	0%
4 Shipping			4,000.00		4,000.00	7%
5 Equipment purchase expense			28,759.21		28,759.21	48%
6 Miscellaneous	0.00	0.00	50.00	0.00	50.00	0%
Sub-Total	10,480.00	6,150.00	43,339.21	0.00	59,969.21	100%

Budget (Expected : JPY)	Kickoff (Nauru)	Research (Tokyo)	Installation (Nauru)	Improvement* (Nauru)	Sub-Total (JPY)	(%)		
1 Travel Expense	782,000	396,750	782,000	0	1,960,750	28%		
2 Daily allowance and Accommodation fee	423,200	310,500	423,200	0	1,156,900	17%		
3 Correspondences and shipping fee	0	0	5,750	0	5,750	0%		
4 Shipping	0	0	460,000	0	460,000	7%		
5 Equipment purchase expense	0	0	3,307,309	0	3,307,309	48%		
6 Miscellaneous	0	0	5,750	0	5,750	0%		
Sub-Total	1,205,200	707,250	4,984,009	0	6,896,459	100%	Expected rate	115.00000 115

Expense (Receipt Base)	Kickoff (Nauru)	Research (Tokyo)	Installation (Nauru)	Improvement* (Nauru)	Sub-Total (JPY)	(%)
1 Travel Expense	273,371	142,050	1,344,164	407,703	2,167,288	111%
2 Daily allowance and Accommodation fee	162,341	117,354	324,694	0	604,389	52%
3 Correspondences and shipping fee	0	0	0	0	0	0%
4 Shipping	0	0	685,854	0	685,854	149%
5 Equipment purchase expense	0	0	4,320,338	0	4,320,338	131%
6 Miscellaneous	0	0	0	0	0	0%
Sub-Total	435,712	259,404	6,675,050	407,703	7,777,869	113%

Estimation of completion (rest of cost)	Kickoff (Nauru)	Research (Tokyo)	Installation (Nauru)	Improvement* (Nauru)	Sub-Total (JPY)	(%)
1 Travel Expense	273,371	142,050	1,344,164	407,703	2,167,288	111%
2 Daily allowance and Accommodation fee	162,341	117,354	324,694	0	604,389	52%
3 Correspondences and shipping fee	0	0	0	0	0	0%
4 Shipping	0	0	685,854	0	685,854	149%
5 Equipment purchase expense	0	0	4,320,338	0	4,320,338	131%
6 Miscellaneous	0	0	0	0	0	0%
Sub-Total	435,712	259,404	6,675,050	407,703	7,777,869	113%

4 Completion

Amount of total expense(JPY)			Expense:	7,777,869	Balance(JPY) 6,539,713
Donation (JPY)	KDDI Foundation			1,238,156	-881,410 Over The Budget!
Initial transfer (JPY)				3,632,362	356,746 OK
Balance due(JPY)				2,907,351	Expected rate 115.00000 115

Expected rest of amount(US$)			
Balance	25,281.31	2,907,351	(JPY)
MAX Request	24,069.21	2,767,959	(JPY)
Deficit of KDDI Foundation	1,212.11	139,393	(JPY)
Request to APT	**24,069.21**		

A-10. **Photo**

After digging pure phosphate (flat before)

Ruins of Japanese banker in world war II

Phosphate Ship yard and shipping phosphate into cargo ship